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Repetition and school dropout.
Policies for the frontiers of
education systems



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Monographic section

Repetition and school dropout. Policies for the frontiers of education systems

Repetición y abandono escolar. Políticas para las fronteras de los sistemas educativos

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At the outer and inner borders of the education system are the most vulnerable students. They are the students who have serious difficulties during their compulsory education. They may be the students who leave the system without secondary certification. And they may also be the adults who will never return to training processes in this context of lifelong learning.

This situation translates into an indicator of the functioning of the educational system which, fortunately, is now called “*Early dropout from education and training*” as opposed to the previous, less fortunate, name of early school dropout. In any case, according to the State System of Educational Indicators (MEFPyD, 2024), we are referring to the percentage of people aged 18 to 24 years who have as their highest level of studies the first stage Secondary

Education or previous educational levels (ISCED 0, 1 and 2), and who do not pursue any type of education or training.

The limiting effects of repetition and early dropout on the present and future of students and their social impact are reflected in educational, medical, economic and psychological literature. Hence, early dropouts constitute one of the main challenges for educational, social and economic systems in many countries. Let's see:

- Early dropout from education and training is associated with higher unemployment rates, lower quality jobs and lower wages. These disadvantages tend to be perpetuated throughout the life cycle, generating discontinuous and vulnerable labor trajectories (Lyche, 2010; Madia et al., 2022).
- Numerous studies have found a strong correlation between low educational level and physical and mental health problems. High school dropouts have higher rates of chronic diseases, poorer mental health and shorter life expectancy, even when controlling for variables such as age, gender and social class (Kivimäki et al., 2020).
- Early dropout from education is an important factor of social exclusion. The lack of a basic qualification limits access to social networks, cultural capital and economic resources, hindering full participation in social and civic life (Dräger et al., 2024; European Commission, 2013; Lyche, 2010). It also contributes to the intergenerational reproduction of poverty by reducing opportunities for socioeconomic improvement and upward mobility.
- There is also empirical evidence suggesting an association between early dropout and a greater propensity to engage in delinquent or anti-social behaviors. Several longitudinal studies show that young people who drop out of school are more likely to conflict with the law or to be part of prison systems (Staff & Kreager, 2008).
- Dropping out of school leads to a significant restriction of opportunities for personal and professional development. Those who do not complete secondary education face more barriers to continue higher education, access vocational training or retraining (Rumberger, 2011).

This limitation prevents effective adaptation to the changing demands of the labor market in the knowledge economy. According to the OECD report (OECD, 2023a), achieving a higher academic level is associated with greater job opportunities, better health, greater social commitment, higher economic rewards and a reduction in the wage gap between men and women.

The individual and social consequences are overwhelming. The question arises as to whether this is a problem that is not only important, which it is, but one of great impact due to the volume of the population it affects. And, unfortunately, the answer is yes.

In Spain, early school dropout rates are a major concern, because they are high and because they are still well above European Union rates. According to the State System of Educational Indicators (MEFPyD, 2024), in 2023 the dropout rate for both sexes stand at 13.7% of students, this percentage being higher for males (16%) than for females (11.3%). It is also observed that in the year 2021 there is a slight change in trend, with these percentages rising slightly again to those indicated, since 2010 the values had begun to fall significantly. A comparison of the figures with the rest of the EU countries is certainly striking in the case of Spain. Seventeen countries are below the EU target for 2030, which is 9% dropout. Spain is at the bottom of the ranking along with Germany (12.8%) and Romania (16.6%).

The rates of repeating students, which we could consider as a prior indicator of educational dropout, also rise in secondary education. The State System of Indicators (MEFPyD, 2024) reports that in the 2021-22 academic year the rate in Secondary is 7.6% on average, finding the highest values in 2nd ESO (8.4%) and 3rd ESO (8%). Compared to the rest of the EU countries, the Spanish repetition rates are only surpassed by those of Luxembourg.

Dropout, sometimes with no return, is a complex problem. It is conditioned by various factors, including low academic performance, gender, lack of school support, or social or economic vulnerability, among others, and could be preceded by some behaviors that place the subject at risk of dropping out, such as absenteeism, segregation or conflict in the classroom (Carabaña, 2011; García and Weiss, 2020; Gubbels et al., 2019; Nieto-Isidro

and Martínez-Abad, 2023).

A recurrent pattern that underlies a good part of the situations of early school dropout, identified in recent literature, is the decrease in self-esteem and self-confidence together with a lack of interest in the study as it is planned. The progressive loss of self-esteem is on the side of the causes of dropout, but also, on the side of the consequences, since the process following dropout intensifies these feelings in those who decide to leave their studies (Consejo Escolar de la Comunidad de Madrid, 2025a). The individual's academic and personal journey, with a progressive loss of self-esteem, will contribute to his or her eventual decision to drop out or not to return to school and, at the same time, will suffer the consequences of dropping out with a decrease in self-esteem.

All these factors are also common to the precursors of grade repetition, although not all of them are linked to individual student characteristics, but to structural and cultural characteristics of our educational system (Save the Children, 2022).

In this context, it is necessary to ask ourselves about the capacity of systems to “retain” the students who have the greatest needs and whose irregular trajectory throughout their schooling puts their future at serious risk. As pointed out by the School Council of the Community of Madrid (2025a), many of the students who drop out have suffered school disengagement processes, either because of a lack of interest in what school can provide them, or because of adverse experiences related to compulsory schooling (learning process, grade repetition, problems with their peers, with teachers, etc.), among others. The controversial effects of grade repetition on school trajectories continue to be analyzed in recent literature (Contini and Salza, 2024). Replacing repetition with alternative measures, based on the principles of individualized treatment and early intervention (Choi et al., 2018), may be a first step to favor a decrease in dropout rates.

The unique rigidity of the systems puts those students who cannot follow a mainstream academic pathway in great difficulty. Offering alternatives adapted to the individual characteristics and needs of the student body is the challenge we face to prevent students from fleeing a system with which they do not feel connected. In this sense, it is necessary to analyze what alternatives

exist and whether it is feasible to develop accompanied schooling for those students with more difficulties. In the same way, flexibilization with alternative itineraries, gateways and modular learning systems are plausible ways to reduce dropout.

It is essential to highlight the educational and social value of preventing early school leaving, prioritizing retention measures and considering return as a subsidiary action that accompanies them. The older the age of return, or the greater the temporal distance between dropout and return, the greater the adverse effects for the individual (Consejo Escolar de la Comunidad de Madrid, 2025a). There is no doubt that it is advisable to avoid dropping out and, if necessary, to reduce the return time in order to minimize the negative consequences and maximize the chances of success in those cases in which the student decides to return. Thus, the Organisation for Economic Co-operation and Development (OECD, 2023b), points out the relevance of identifying those young people who are at risk, thanks to the use of a school vulnerability index, and providing appropriate guidance to ensure the completion of secondary schooling. Early school dropout is not a phenomenon that happens abruptly and can be defined as a process of progressive disengagement (Conde Vélez et al., 2023; Fernández-Enguita et al., 2010) that is more or less visible (Patton and Price, 2010). Early detection, as well as the reinforcement of guidance systems, is at the center of all approaches, forming an indivisible polynomial (guidance, diagnosis, retention, return). Among the school factors that condition this problem to a greater extent are those variables linked to the teaching staff and the provision of academic-vocational guidance (Consejo Escolar de la Comunidad de Madrid, 2025a; Gutiérrez-de-Rozas et al., 2025). Specifically, this academic-vocational guidance will make possible the individualized accompaniment and follow-up (accompanied schooling), which will allow students to contemplate diverse options and paths adapted to their circumstances, motivational and vocational (Consejo Escolar de la Comunidad de Madrid, 2025b).

The aim of this monograph is to provide contrasted knowledge to researchers, educational policy makers and the educational community in general, in order to define a common knowledge space to design policies that contribute, on the basis of diverse evidence, to the understanding and prevention of stu-

dents with school vulnerability. There are eight articles in this issue. However, they can be grouped by their subject matter into three large blocks.

The first three articles analyze in depth the determinants of grade repetition and school dropout and the consequences within the school context.

The article by Fernández-Alonso, Cañamero, Postigo, and Núñez opens this first section with an innovative and original methodological contribution, thanks to their approach to the relationship between repetition and socioeconomic and cultural level, considering the difficulty of neutralizing the two types of bias inherent to studies on repetition: selection bias and covariate control. Thus, the research carried out combines propensity analysis to control pre-repetition selection bias and adjustment through multilevel logistic models to control for post-repetition covariates. The discussion on repetition may be enriched using robust data from research in which both biases are controlled for.

The contribution by Brañas-Garza and Jorrat addresses the difficult and understudied issue of the social integration of students who repeat grades. By studying the social relationship networks in the classrooms of a large sample of students, they compare, on the one hand, “twin” students with similar academic characteristics except for repetition, using propensity score matching techniques to analyze whether social integration in the classroom is similar between the two groups. On the other hand, repeaters who are repeating this academic year are compared with those who were repeaters in previous years, to study the evolution of their socialization. It is an original article due to its subject matter, with excellent research design and very pleasant to read. However, the results offered are not encouraging.

Martínez Abad, Nieto-Isidro and Rodríguez-Conde make an avant-garde contribution, thanks to the analysis of the relationship between grade repetition and contextual and non-cognitive factors of the student, including the analysis of the peer effect. Secondary work with data from the latest PISA assessment, applying multilevel logistic models with fixed slopes and random intercepts, allows us to identify a significant impact of the student’s school environment on grade repetition. The impact of the peer effect, with a classification of protective and promoter factors on repetition, invites us to rethink the strategies applied in the educational system to promote school success.

The next block is made up of four contributions that address the issue of second-chance schools and other alternative routes for educational return.

The contribution by Aymá, García-Montero, Vila and Bayón shows the evolution and impact of Second Chance Schools in Spain. It also has the essential collaboration of the Second Chance Schools Association (E2O Association), which has made it possible to analyze and present the Second Chance Schools in Spain as an effective and successful alternative that makes it possible for young people between 15 and 29 years of age who have dropped out of school prematurely to return to the educational system, improving their living conditions and favoring their insertion into the labor market. It does this by integrating three key elements into its model: transversal competencies, personalized accompaniment and the concept of a positive exit. The E2O are an educational and social reference that, thanks to the work of Aymá and collaborators, we can understand and know in depth from a practical point of view.

Camilli, Fontana and Pastor-Gil, allow us to continue delving deeper into Second Chance Schools, this time, from the solid approach of an exploratory systematic review, which allows us to clarify what research studies about Second Chance Schools, as well as the main characteristics and results of their training programs in the young people who participate in them. The analysis of the selected articles reveals the importance of a comprehensive and personalized approach, key to the success of these schools. The study contributes to consolidate and disseminate knowledge about the functioning of Second Chance Schools and their pedagogical implications. This is an essential reading that crosses the boundaries between theory and practice, thanks to the final proposal of a series of implications for educational public policies.

Closing the block dedicated to Second Chance Schools, the in-depth look at the qualitative study by Chisvert, Palomares, García and Merino, allows us to understand how the transitions between these educational institutions are articulated and the logic behind them, as well as the coordination and intended bidirectionality in the trajectories to which they give rise. The qualitative methodology and the triangulation of agents and instruments are the characteristic notes of the scientific support of this solid research that allows us to explore the viewpoint of IES teachers, E2O professionals and the young people themselves. From the diagnostic point of view, the analysis has made

it possible to identify some undesired effects of educational policies and some divergences in their application at the autonomous level. The work is a must-read for an in-depth understanding of the reality of the E20.

Analyzing the benefits of the experience as a student in Basic Vocational Training (FPB), as well as the study of the socio-educational strategies that make it possible to achieve these benefits, is the objective of the work of Piñero, Fonseca and Moro, which, from the discursive analysis of 132 key informants (students, family members, educational team and managers) through 17 discussion groups in 12 centers in the Basque Country, unravels the complex network that these benefits entail for the students. The results show how the experience is not only limited to academic gains, but transcends to personal, family, peer and adult relationships. The surprising findings on the feeling of protection and “re-cognition” will be of special interest to the educational community in general and, especially, to FPB professionals.

Educational dropout closes this monograph and constitutes the last conceptual block. The article by Mello-Román, Escobar-Torres, Segura, De la Iglesia, Giménez, Hernández, Mello-Román and Pérez addresses factors associated with school dropout in the years prior to the completion of secondary education in Paraguay. The application of machine learning models for the identification of dropout patterns and the prediction of their risk is undoubtedly an innovative and necessary contribution that brings us closer to the desired “school vulnerability index” proposed by the OECD (2023b). The main findings of the paper highlight the importance of carrying out massive data analysis, applying advanced models for the strengthening of school retention policies and the design of evidence-based early intervention strategies. The challenges we face in this line are not few, but they are undoubtedly very encouraging.

We return here to the initial metaphor, it is possible that borders in the educational system will never disappear, since it does not seem reasonable to aspire to the non-university system’s lack of difficulties in academic trajectories. What we can aspire to is that there should be small frontiers considering the volume of the population affected and that they should be permeable, since the emphasis of educational policies should be on the adaptation of educational environments and programs for all people with a view to the re-

turn to lifelong learning. We would like to think that the concept of academic trajectories can be described as constant rather than successful (although this is also desirable).

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Grade retention, socioeconomic determinants, and research quality

Repetición escolar, determinantes socioeconómicos y calidad de las investigaciones

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Abstract

The relationship between repeating school years and socioeconomic and cultural level has been widely studied in Spain. However, the results of those studies are varied and occasionally even conflicting. One reason for these differences may be the difficulty in neutralizing two types of biases inherent in studying repetition: selection bias and covariate control. The aim of this study was to estimate the probability of repeating a school year in three social status groups: low, middle and high. A sample of 5999 students was used, assessed at two timepoints (T1 = 4th grade; and T2 = 8th grade). At T1, the sample was from the same grade and were the same age: students had not repeated any school years and the first repetitions did not occur until the end of 6th grade. The study combined two analytical approaches: At T1, the groups (retention-promotion) were matched using a propensity analysis to control for pre-retention selection bias. At T2, the matched estimates were adjusted using multi-

level logistic models, incorporating control for post-retention covariates. The predictions of three models were compared, defined by the degree of control included in their design: (1) descriptive, with no control variables or equivalent groups; (2) cross-sectional, with control for covariates only at T2; and (3) longitudinal, with dual control—pre-retention equivalent groups plus post-retention adjustment variables. The results showed that the model with better bias control (longitudinal) exhibited more moderate and partially significant effects. The data highlight the need to develop specific research in Spain on grade repetition that includes repeated measures before and after repetition with matched samples, or the alternative use of quasi-experimental approaches. In this way, the debate on grade repetition will be enriched by the contribution of fully valid data.

Key words: repetition, education, socio-economic status, hierarchical models, propensity score.

Resumen

La relación entre repetición y nivel socioeconómico y cultural ha sido ampliamente estudiada en España, sin embargo, las estimaciones ofrecidas son variadas, incluso discordantes. Una razón de estas divergencias puede ser la dificultad de neutralizar dos tipos de sesgos inherentes a los estudios sobre repetición: el sesgo de selección y el control de covariables. El objetivo de esta investigación fue estimar la probabilidad de repetir en tres grupos de estatus social: bajo, medio y alto. Se manejó una muestra de 5999 estudiantes evaluados en dos momentos (T1 = 4º EP; y T2 = 2º ESO). En T1 la muestra era del mismo grado y misma edad: el alumnado no habían repetido previamente y las primeras repeticiones no se produjeron hasta finalizar 6º EP. El trabajo combinó dos aproximaciones analíticas: en T1 los grupos (repetición-promoción) fueron equiparados mediante un análisis de propensión para controlar el sesgo de selección pre-repetición. En T2, las estimaciones equiparadas se ajustaron a modelos logísticos multinivel, lo que añade el control de covariables post-repetición. En concreto se compararon las predicciones de tres modelos, definidos por el grado de control incluido en su diseño: (1) descriptivo, sin variables de control ni grupos equivalentes; (2) transversal, solo con control de covariables en T2; y (3) longitudinal, con doble control, es decir, grupos equivalentes pre-repetición más variables de ajuste post-repetición. Los resultados evidenciaron que el modelo con mejor control de sesgos (longitudinal) presenta efectos más moderados y parcialmente significativos. Los datos ponen de manifiesto la necesidad de desarrollar, en nuestro país, investigaciones específicas sobre repetición que incluyan medidas repetidas pre y post-repetición con muestras equiparadas, o el uso alternativo de enfoques cuasi-experimentales. De este modo el debate sobre la repetición escolar se enriquecerá con la aportación de datos plenamente válidos.

Palabras clave: repetición, educación, estatus socio-económico, modelos jerárquicos, análisis de propensión.

Introduction

Grade repetition is an educational measure rooted in the 19th century. Graded schooling made mass education feasible in the emerging liberal states, and repetition became the standard response for students who deviated from group homogeneity or failed to meet academic expectations (Shepard & Smith, 1989). It has been a controversial measure since its inception, as indicated by the earliest work (Ayres, 1909), compendiums of research in the first half of the 20th century (Goodlad, 1954; Jackson, 1975), and by what is probably the first monograph on the topic published by the *California Journal of Elementary Education* (Heffernan et al., 1952). These seminal studies quickly identified the causes of repetition, mostly associated with individual factors: poor academic performance, deficits in cognitive functioning, socioemotional maladjustment, and behavioural or health problems. All of those remain as causes, as indicated to a greater or lesser extent by quantitative meta-analysis (Goos et al., 2021; Holmes, 1989; Holmes & Matthews, 1984; Jimerson, 2001a) and systematic qualitative reviews (Biegler & Green, 1993; Jimerson, 2001b; Shepard & Smith, 1990, Valbuena et al., 2021; Xia & Kirby, 2009). This means that any study into grade repetition must consider these factors in its analysis.

A second explanatory source of grade repetition lies in certain socio-demographic, family, and contextual characteristics. These include being male, an immigrant, or younger than one's peers; coming from broken homes, reconstructed, or more diverse families; and having fewer economic and cultural incentives and resources (Cordero et al., 2014; Organisation for Economic Co-operation and Development [OECD], 2016; Urbano & Álvarez, 2019; Xia & Kirby, 2009). The present study focuses on examining the relationship between repetition and this second source of variation.

Various findings indicate that repetition is conditioned by culture. For example, the extent of repetition varies widely between countries, reflecting each society's acceptance or rejection of the measure (e.g., OECD 2010, 2016). There are also differences in countries' regulations concerning it (European Education and Culture Executive Agency, 2011) and how they manage student diversity, which seems to be associated with the effectiveness of the measure (Goos et al., 2021). Lastly, the effects of repetition seem to depend on the palliative measures that are available: in some education systems, repetition is not accompanied by additional support, whereas in others there are alternative complementary actions or special programmes (Fernández-Alon-

so et al., 2022, Valbuena et al., 2021). This is justification for focusing the rest of this review on the Spanish context.

Compared to the English-speaking world, Spanish research on grade repetition is very recent, and has mostly been undertaken thanks to data produced by large-scale national (e.g., López-Agudo et al., 2024) and international evaluations (e.g., Agasisti & Cordero, 2017; Blanco-Varela & Amoedo, 2025). The conclusions about the relationship between repetition and social status do not seem to be unanimous. Duran-Bonavila et al. (2024) found that social status lost its predictive capacity over repetition when cognitive skills were controlled for, and Fernández and Rodríguez (2008) noted that socioeconomic level stopped being statistically significant when the results in PISA were considered. Along similar lines, Carabaña (2011) indicated that repetition was not a classist measure, and that it could be explained by what may be logically expected to explain it: school performance, also measured with PISA scores.

Nonetheless, Spanish research has mostly concluded that there is an inverse relationship between measures of social status and the probability of grade repetition (Arroyo et al., 2019; Cabrera et al., 2019; Carabaña, 2013, 2015; Choi et al., 2018; Cobreros & Gortazar, 2023; Cordero et al., 2014; García-Pérez et al., 2014; González-Betancor & López-Puig, 2016; López-Rupérez et al., 2021). However, within this group, estimations of the strength of the relationship vary. For example, Arroyo et al. (2019, p. 85) stated that for repetition, the preponderance of socioeconomic variables was not clear, while Carabaña (2015, p. 24) noted that social determinants were much less important in explaining repetition. At the other extreme, Cobreros & Gortazar (2023) and the OECD (2016) concluded that, for equal levels of competency, the 25% of students from the lowest socioeconomic level were almost four times more likely to repeat a grade than the 25% of students from the highest socioeconomic level. The data from Choi et al. (2018) allow us to estimate that the probability repeating a year for a student at the median of the lower quartile of social status is 4.4 times higher than students at the median of the upper quartile. Official reports, which generally contain descriptive analyses, offer even more sobering estimations that are compatible with a system that is highly reproductive of inequalities in school access (Instituto Vasco de Evaluación e Investigación Educativa [IVEI], 2009). The High Commission for Child Poverty [*Alto Comisionado contra la Pobreza Infantil*] (2020) warned that one out of every two students in the first income quartile would repeat a grade during compulsory education, whereas in students from higher

income households that figure was less than one in ten. Furthermore, the Education Department of Asturias [*Consejería de Educación del Principado de Asturias*] concluded that 60% of repetitions were concentrated in the 30% of students from the lowest social strata.

This variability of results, which is less than useful for designing educational policy, may at least in part be explained by the quality of study designs: studies with little control over selection bias and covariable adjustment tend to overestimate the adverse effects of repetition (Allen et al., 2009; Jackson, 1975; Lorence, 2006). In Spain, with few exceptions (López-Agudo et al., 2024; Rodríguez-Rodríguez, 2022), most research on repetition has been based on cross-sectional designs (Choi et al., 2018), where the main independent variable (generally results of an external test) is measured after the dependent variable (Carabaña, 2015). This may contaminate the conclusions, as it is impossible to ensure group equivalence (repeaters and non-repeaters) before the repetition, thus introducing selection bias into the calculations.

The aim of the present study is to estimate the probability of repetition for three groups of sociocultural status. Although this is not an original objective, our study provides a new perspective in two ways. Firstly, it uses a database that meets all of the desired characteristics for a high-quality study on repetition (Goos et al., 2021; Valbuena et al., 2021): it deals with a representative sample, it has a set of substantive covariables measured pre- and post-repetition, and it uses propensity matching analysis to minimise selection bias before repetition.

Secondly, the aforementioned characteristics of the database allow for an additional, novel objective in the literature on repetition in Spain: showing how variations in plans of analysis of the same data offer different estimations of the strength of the relationship between repetition and sociocultural status. To that end, the results of three models will be compared:

- Model 1: descriptive. Does not include control variables and reproduces the calculations in official reports (e.g., IVEI, 2009) and lower quality analyses.
- Model 2: cross-sectional. Recreates the results of the most usual analytical-methodological approach in Spanish research: multivariate regression analysis of an *ex post facto* descriptive design (e.g., Cobreros & Gortazar, 2023) with post-repetition adjustment of covariables.

- Model 3: longitudinal. This is the highest quality design as it includes a dual control: post-repetition adjustment of covariables and pre-repetition matching of groups to minimise selection bias (Krestschmann et al., 2019).

To the best of our knowledge, there are no studies in Spain to date that have included dual control pre- and post-repetition on a single sample. In light of previous evidence (e.g., Allen et al., 2009) the model with least control of bias is expected to show greater effects, in other words to overestimate the probability of low social status students repeating a year. In contrast, better experimental control is expected to demonstrate more moderate effects, which in certain conditions may even dilute statistical significance.

Method

Sample

The initial sample was made up of the 7,479 students who in practice comprised the student population in the 4th year of primary education in the Principality of Asturias in academic year 2008/09. All students were assessed at two timepoints, in the 4th year of primary and in the 2nd year of secondary education (ESO), labelled T1 and T2. In order to achieve as homogeneous a sample as possible, the following cases were removed from the original sample: students with insufficient information from before T1 (N = 100); those who repeated a year before T1 (N = 677); those who repeated at the end of their 4th year of primary, i.e., six weeks after T1 (N = 140); and those who did not participate at T2 either because they had moved or they were absent on the day (N = 554). The final sample comprised 5,999 students, all born in 1999, who were the same age and in the same school year at T1. Out of that sample, 762 would repeat a year between T1 and T2.

Instruments

Information for this study came from three sources: administrative records, cognitive tests, and student context questionnaires.

Dependent variable

Repetition condition, a binary variable (1 = having repeated a year between T1 and T2) extracted from the records of the Asturias Department of Education.

Variable of interest

Student ISEC group. Teachers completed a questionnaire that asked about each student's parents' professions and educational attainment. This method of collecting information is more reliable than student self-reports and there was almost no missing data. These records allowed construction of a socioeconomic and cultural index (ISEC) which was standardised $[N(0,1)]$ according to the procedure laid out by Peña-Suárez et al. (2009). Exploratory Factor Analysis indicated that the ISEC was essentially unidimensional: optimal implementation of parallel analysis (Timmerman & Lorenzo-Seva, 2011) recommended a single factor; the percentage of variance explained by the first factor (61.41%) was high; and the indices of unidimensionality (Uni-Co = .952; MIREAL = .307) and model fit (CFI = .977; RMSR = .049) were very good. The ISEC score was recoded to produce the variable *ISEC-group*, which split the sample into terciles: *Low*, *Medium*, and *High_ISEC*.

Adjustment variables

Eight **sociodemographic variables** were considered. Two were at the individual level, from the administrative records: gender (1 = *Girl*) and nationality (1 = *Immigrant*). The rest were school variables measured at T1 and T2: school type (1 = Public school), proportion of migrant children ($yMigrant_T1$ and $yMigrant_T2$), and the mean ISEC score ($yZISEC_T1$ and $yZISEC_T2$).

Schooling and **academic performance** were defined with 12 variables. The schooling measure was *Change of school* between T1 and T2, which was dichotomous (1 = yes). The remainder were measures of academic performance which included *Grades in Spanish, Mathematics, and English* at T1 and T2, which were also averaged to produce a Grade Point Average score (*ZGPA_T1* and *ZGPA_T2*). The eight grade variables were standardised on an $N(0, 1)$ scale and in the multilevel analysis on the school means, so that positive values indicated performance above the school average. Finally, to measure cognitive achievement at T1, the study included scores in the 2009 Diagnostic Assessment, which evaluated three skills: *Communication in English, Learning to Learn, and Social and Civic Skills* (*Test_ENG*, *Test_LtL* and *Test_CIV*)¹. These scores were calculated via models derived from Item Response Theory (unidimensional logistic models with 2 and 3 parameters) using Parscale 4.1 software (du Toit, 2003). The scores were expressed on a scale $N(500, 100)$. The 11 academic performance variables were averaged by school to give a proxy of the school's mean level.

Two **socio-emotional variables** were considered: self-concept and academic effort. Students completed a context questionnaire containing five statements such as, "I learn lessons easily". Each statement was scored on a four-point Likert type scale: never or almost never; sometimes; usually; always or almost always. The responses were used to construct the academic self-concept scale (*ZSelf-Concept_T1* and *ZSelf-Concept_T2*) which at T1 was essentially unidimensional: the first factor explained 66.55% of the variance; optimal implementation of parallel analysis recommended a single dimension; and both the indices of unidimensionality (UNICO = .999, ECV = .982, MIREAL = .090; Calderón-Garrido et al., 2019) and fit were good. Despite the small number of items, the scale seemed consistent between the two timepoints (T_1 : $\alpha = .87$, $\omega = .88$; T_2 : $\alpha = .91$; $\omega = .91$). The *ZSelf-Concept_T1* and *ZSelf-Concept_T2* scores were expressed on a normal scale [$N(0, 1)$], where positive values indicated good academic self-concept.

Lastly, the academic effort variable (*ZAcademic-Effort_T1* and *ZAcademic-Effort_T2*) was constructed from the response to five statements such as: "I finish my tasks even if they are difficult". Students' levels of agreement

1 The tests have been released and are available at: <https://www.educastur.es/consejeria/evaluacion/diagnostico>

with each statement was scored the same way as for self-concept. Despite having few items, the scale demonstrated high internal consistency (T_1 : $\alpha = .80$, $\omega = .80$; T_2 : $\alpha = .77$, $\omega = .78$). At T1, the first factor explained 55.5% of the total variance and exhibited excellent indices of fit (GFI = .999, RMSR = .022; Calderón-Garrido et al., 2019). The psychometric properties at T2 were similar: the first factor explained 52.6% of the variance and the indices of fit were very good (GFI = .998, RMSR = .029). Factor loadings of all items ranged between .523 and .748, which confirmed that the scale was essentially unidimensional at both timepoints (Postigo et al., 2021a, b). Evidence of validity of internal structure and reliability of the scores was examined using FACTOR.12.04.04 software (Ferrando & Lorenzo-Seva, 2017).

Procedure

The study is a secondary exploitation of the Asturian Educational Diagnostic Evaluation [*Evaluación de Diagnóstico Educativo del Principado de Asturias*], a testing program run by the regional educational department. The responsibilities were assigned as follows: school management managed application of the assessments within each school; the school inspection service performed quality control for the program; and the evaluation service coded and analysed the data.

Data analysis

As noted previously, in order to mitigate the biases inherent to all studies on repetition, this study used a dual control strategy: matching scores and fitting multilevel models.

Score matching at T1

Scores were matched via propensity score matching analysis (PSM), which is the most widely used approach in psychoeducational research on repetition (Krestschmann et al., 2019; Wu et al., 2010;). The aim is to match an experimental group (repeaters) with a control group (non-repeaters) so that they are equivalent before the treatment (repetition) (Stuart, 2010; Zhao et al., 2021).

PSM follows a series of steps (Ho et al., 2011) that can be summarised in three stages: planning, execution, and evaluation of results.

The following matching variables were first selected for T1: (1) socio-demographic factors, *Girl*, *Immigrant*, *Public_School_T1* and *yZISEC_T1*; (2) proxies of prior achievement, scores in Spanish, English, and Mathematics at T1, the grade point average (*ZGPA_T1*), and the scores in the 2009 Asturian Diagnostic Evaluation; (3) socio-emotional measures, *ZSelf-Concept_T1* and *ZAcademic-Effort_T1*. All of the attitudinal and performance measures were considered at the individual and at the school level. Girls tend to exhibit better performance than boys in communicative-linguistic areas (Mullis et al., 2023) and usually make more effort academically (Postigo et al., 2021a), although they tend to see themselves as less competent, especially in maths (Mejía-Rodríguez et al., 2021). In addition, publicly funded schools demonstrate lower school performance and higher numbers of migrant children and repeaters (Instituto Nacional de Evaluación Educativa, 2019). Because of that, the matching also included the interactions between these variables. In summary, the propensity scores were estimated using a model with 27 covariables and 16 terms of interaction between variables.

In the execution phase, students in each group were matched based on their propensity scores, which were expressed as the conditional probability of receiving treatment (i.e., repeating) given the vector of specific covariables (Zhao et al., 2021). There are a range of matching methods, and the literature recommends comparing various options and choosing the one which offers the best balance (Austin, 2014). In this case we compared two types of algorithms. The first were matching methods of one-to-one cases: nearest neighbour without replacement, optimal pair matching, and genetic matching. The second type were algorithms that used non-uniform weighting: nearest neighbour with replacement, generalised full matching, and subclassification. To improve the matching balance, and depending on the possibilities offered by each method, customisations were included such as matching in specific order, restricting the distance between pairs, or matching with $k > 1$.

Finally, the matching method was selected based on two criteria: balance strength and sample size. Each criterion minimises one type of bias which are occasionally in opposition: treatment effect and sample selection. Better balance indicates suitable matching and therefore less bias when estimating the effect of the treatment. However, if severe restrictions are needed to achieve robust matching (such as only matching cases with small differences in propensity scores), that would increase the likelihood of excluding

matches, which may introduce sample selection bias or bias due to incomplete matching. In the present study, balance was considered satisfactory when the standardised differences between groups, and the differences in the empirical cumulative distribution function (eCDF) were close to zero; and the ratio of variances were close to one. Bias due to incomplete matching was assessed using the percentage of discarded, unmatched cases and the size of the effective sample achieved by each algorithm. The matching was done using the *Matching* package (Sekhon, 2011), and evaluation of balance used *Cobalt* (Greifer, 2023), both in R (R Core Team, 2023).

Multilevel models at T2

School phenomena are multilevel and, logically, each level of the hierarchy has a different variability and errors are not independent (Gaviria & Castro, 2005). Hierarchical or multilevel models are specifically developed to analyse data with a nested structure and address the problem of the “design effect” in cases where errors are not independent (Fernández-Alonso & Muñiz, 2019). In addition, because the dependent variable in the study is binary, it is unrealistic to assume normality. Because of that, we used the multilevel binary logistic model (Bernouilli), which allows use of various types of predictor variables (continuous, discrete, binary...) in all levels of analysis.

As noted at the end of the Introduction, three models were specified in this study. Model 1, which estimated the probabilities of each ISEC group repeating without control variables, has two functions: it serves as a comparison for the other models and recreates the raw estimations from the descriptive analysis. Model 2 includes the sociodemographic, school, cognitive, and socio-emotional variables measured at T2 and reproduces the estimations of a cross-sectional design—the most common design in Spanish research on repetition. Model 3 adds the weightings from matching groups prior to repetition and therefore has a double statistical control: adjustment of post-repetition covariables from the cross-sectional design, and matching groups pre-repetition (Kreuschmann et al., 2019).

The results of these models are presented in terms of odds and odds ratios (OR). The latter allow us to compare the odds of different values of an independent variable, quantifying and indicating the direction of the association between the dependent variable and its predictors in the binary logistic regression. The analysis was done using HLM 7.0 (Raudenbush et al., 2011).

Missing values

The amount of missing data ranged from 0% to 12% depending on the variable. Data was recovered in two stages: where a case had incomplete data in one variable, the missing data was replaced with the subject mean. For completely missing values, we used the *Expectation-Maximization* algorithm with auxiliary variables offered by SPSS 24 (IBM, 2016). Fernández-Alonso et al. (2012) showed that this two-stage process is the best for recovering missing data when, as in this case, the size of the missing data is small and the bias is moderate.

Results

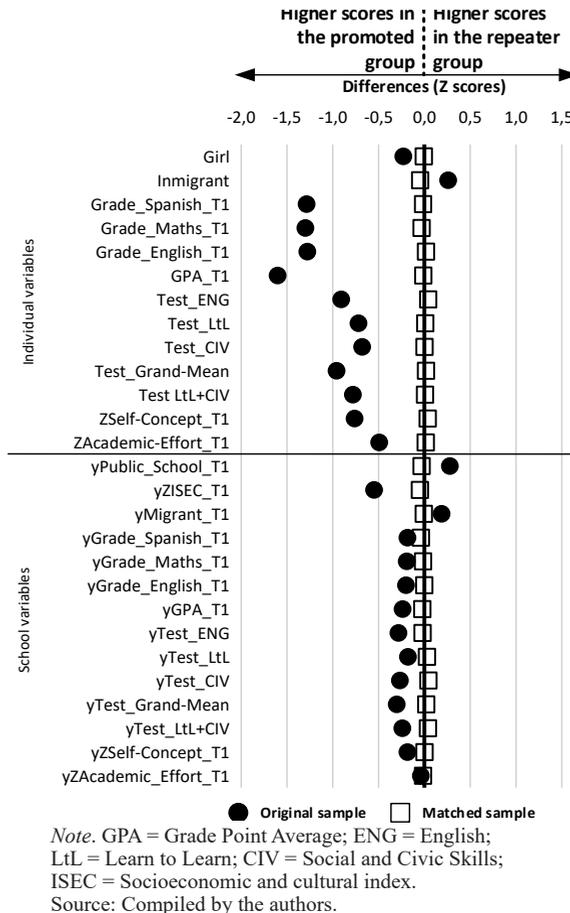
Before presenting the results of the adjusted models, it is necessary to offer evidence of the quality of the group matching at T1. This is fundamental for interpreting the comparison of the subsequent models, especially model 3, where it is assumed that the correlation between repetition and predictors in T1 (pre-repetition) is equal to 0.

Matching groups in T1

The two best-balanced matching procedures were nearest neighbour without replacement (NN), from the one-to-one matching algorithms, and generalised full matching (GFM) from the non-uniform weighting algorithms. Ultimately, GFM was chosen because, unlike NN, it allows all the cases in the control group to be used, which is a preferred criteria when two matching procedures offer similar balance (Sävje et al., 2021). The matched sample was made up of 762 repeaters and 5237 non-repeaters, which is equivalent to an effective control sample of 395 cases.

Figure 1 shows the differences in standardised means between the groups before and after matching. Before matching, the circles indicate highly significant differences, with higher scores generally for the non-repeater group. For example, the difference in school grades was around 1.5 standard deviations. With this imbalance it would be impossible to determine whether potential differences found at T2 were due to having repeated a year or merely indicative of an initial discrepancy.

FIGURE I. Difference in means (Z scores) between the groups before and after matching.



The squares show the differences after matching. All differences were smaller than $|0.1|$, hence the markers are around the value of $Z = 0$. The statistical matching created two groups that were comparable before any repetition in terms of previous performance, socio-emotional traits, and sociodemographic characteristics. This will allow us to discount any differences that may be found at T2 as being related to the matched variables at T1, minimising the bias of selecting the groups to compare.

Comparison of models

Table 1 shows the results of the descriptive model. The intercept (-1.94) corresponds to the logit of ISEC_Medium, which had a low associated probability of repetition (OR = 0.14), and was quite precise given the narrow confidence intervals. The OR for the High_ISEC group (0.17) indicates a probability of repetition that was approximately 85% lower than the reference group, while the students in the Low_ISEC group were more than twice as likely to repeat a year than the Medium group and almost 13 times more likely (2.11 / 0.17) than the High group.

TABLE I. Model without adjustment covariables: prediction of repetition

Fixed effects	Coefficient	Standard error	Odds Ratio	Confidence intervals
Intercept (Medium_ISEC)	-1.943	0.074	0.143	(0.124;0.166)
High_ISEC	-1.792	0.154	0.167	(0.123;0.225)
Low_ISEC	0.749	0.088	2.114	(1.781;2.511)

Note. ISEC = Socioeconomic and cultural index.
Source: Compiled by the authors.

Table II shows the estimations of the cross-sectional model. On including the control variables, the probability of the Medium_ISEC group repeating fell by almost two thirds (OR = 0.06). The OR of the High group practically doubled (0.30), indicating that the probability of repeating fell by 70%, while in the Low_ISEC group, the probability of repeating was approximately 66% higher than the reference group, and 5.5 times higher than the High_ISEC group.

TABLE II. Cross-sectional model: prediction of repetition

Fixed effects	Coefficient	Standard error	Odds Ratio	Confidence intervals
Intercept (Medium_ISEC)	-2.901	0.148**	0.055	(0.041;0.074)
Variables of interest				
High_ISEC	-1.207	0.185**	0.299	(0.208;0.430)
Low_ISEC	0.505	0.113**	1.657	(1.327;2.069)
Individual variables				
Change school	0.985	0.198**	2.677	(1.816;3.947)
Girl	-0.266	0.098**	0.766	(0.632;0.929)

Immigrant	0.908	0.219**	2.479	(1.615;3.804)
ZGPA_T2	-1.389	0.103**	0.249	(0.204;0.305)
ZSelf-Concept_T2	-0.369	0.074**	0.691	(0.598;0.799)
ZAcademic-Effort_T2	-0.388	0.062**	0.678	(0.600;0.766)
School variables				
yPublic_School_T2	-1.055	0.202**	0.348	(0.234;0.519)
yMigrant_T2	0.951	1.412	2.589	(0.159;42.19)
yZISEC_T2	-0.756	0.149**	0.469	(0.350;0.630)
yZGPA_T2	-0.827	0.261**	0.438	(0.261;0.733)
yZSelf-Concept_T2	0.004	0.436	1.004	(0.424;2.380)
yZAcademic-Effort_T2	0.177	0.304	1.194	(0.655;2.179)

Note. ISEC = Socioeconomic and cultural index; GPA = Grade Point Average.
Source: Compiled by the authors.

The main change in the longitudinal model (Table III) was in students in the Low_ISEC group. The coefficient was on the edge of statistical significance and the probability of them repeating was only 3% greater than the Medium_ISEC group. The effect when comparing the two extreme groups was also much reduced, practically by half. The OR of the Low_ISEC group was 2.4 times greater than the High_ISEC group. Some covariables at T2 lost their statistical significance due to the effect of the statistical matching at T1.

TABLE III. Longitudinal model: prediction of repetition

Fixed effects	Coefficient	Standard error	Odds Ratio	Confidence intervals
Intercept (Medium_ISEC)	-2.965	0.241**	0.052	(0.032;0.083)
Variables of interest				
High_ISEC	-1.009	0.234**	0.423	(0.323;0.554)
Low_ISEC	0.410	0.172*	1.030	(0.872;1.217)
Individual variables				
Change school	0.554	0.272*	0.807	(0.443;1.468)
Girl	0.146	0.134	0.364	(0.230;0.577)
Immigrant	-0.215	0.305	1.507	(1.075;2.111)
ZGPA_T2	-0.861	0.138**	0.509	(0.442;0.587)
ZSelf-Concept_T2	0.030	0.085	1.158	(0.890;1.505)
ZAcademic-Effort_T2	-0.675	0.073**	0.807	(0.443;1.468)

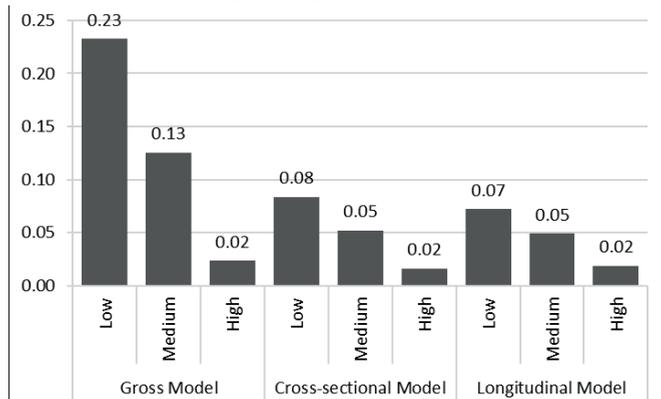
School variables

yPublic_School_T2	-0.663	0.320*	0.515	(0.274;0.969)
yMigrant_T2	-2.748	2.133	0.064	(0.001;4.342)
yZISEC_T2	-0.224	0.301	0.800	(0.441;1.449)
yZGPA_T2	-0.734	0.476	0.480	(0.187;1.230)
yZSelf-Concept_T2	-0.678	0.751	0.508	(0.115;2.239)
yZAcademic-Effort_T2	0.631	0.491	1.158	(0.890;1.505)

Note. ISEC = Socioeconomic and cultural index; GPA = Grade Point Average.
Source: Compiled by the authors.

Figure II shows an alternative way of comparing the models' estimations. It shows the probability of each group repeating according to each model. The longitudinal model is the one that most reduces the probabilities of the Low and Medium groups repeating, while the probability of the High group repeating is relatively stable.

FIGURE II. Probability of repeating by model and ISEC group



Source: Compiled by the authors.

Discussion

Educational research has mostly identified a negative relationship between indicators of social status and the likelihood of repetition. However, the conclusions have not been unanimous (e.g., Fernández & Rodríguez, 2008). Furthermore, in the studies that have found significant relationships, the estimations of the strength of the association have been varied (e.g., Carabaña, 2015; Cobreros & Gortazar, 2023). One plausible reason for these differences may lie in the design of these studies, as insufficiently controlling bias has been well documented to tend to lead to overestimation of the negative effects of repetition (Lorence, 2006).

In this context, the present study compared the probability of repetition according to socioeconomic and socio-cultural status, using a single database to estimate three analytical models that simulated a range of study designs: (1) descriptive, without controlling variables; (2) cross-sectional, with control of covariables post-repetition; and (3) longitudinal, with double control of bias, both pre- and post-repetition. To the best of our knowledge, this is the first study of its kind in Spanish research on the association between repetition and social status. The comparison was possible because the study was able to use a high-quality database allowing simulation of analysis conditions, gradually incorporating increased control of biases associated with repetition.

In line with most previous research (e.g., Choi et al., 2018; Cordero et al., 2014; García-Pérez et al., 2014; López-Rupérez et al., 2021), the study indicated that repetition is affected by social class. This has also been confirmed by research in various different education systems (e.g., Bastos & Ferrão, 2019; Ferrão et al., 2017; Klapproth & Schaltz, 2015; Salza, 2022; Xia & Kirby, 2009). However, our data suggest that, at least in the Spanish context, there is nuance to the relationship between repetition and social class. As one might expect, socio-cultural status had a strong impact on the probability of repetition in the descriptive model. Students in the Low ISEC group were more likely to repeat a year than their classmates in the Medium ISEC group, while those students in the High ISEC group were significantly more protected against the risk of repetition. Model 2 reproduced the estimations of cross-sectional analysis, the most common design in Spanish research. All of the covariables at T2 were significant, and once they were controlled for, the probability of Low_ISEC students repeating was 5.5 times higher than High_ISEC students doing so. This is similar to the calculations for Asturias

(6.2 times higher) using data from the two most recent PISA tests (Cobrerros & Gortazar, 2023).

The third model produced interesting changes, which can be summarised in three conclusions. Firstly, compared to the cross-sectional model (Model 2), the longitudinal model (Model 3) reduced the difference in probabilities of repetition between the two extreme ISEC groups (Low vs. High) by 56%, from 5.5 times to 2.4 times. This would seem to confirm that better control of biases produces more conservative estimations of repetition's negative effects (Allen et al., 2009). Although there are Spanish studies that have gone beyond adjusting for covariables in descriptive *ex post facto* designs (e.g., Rodríguez-Rodríguez, 2022), the evidence from our study suggests the need to perform studies that consider all potential sources of bias when studying repetition (Goos et al., 2021; Valbuena et al., 2021).

Secondly, in the longitudinal model, the difference in Odds Ratios between the Low and Medium ISEC groups practically disappeared. This adds detail to previous conclusions on the relationship between repetition and social class. There is some consensus (e.g., Carabaña, 2015; García-Pérez et al., 2014) that repetition tends to be concentrated in children of mothers with little education, or in the minority whose parents had very low levels of education. Our data indicate an alternative interpretation, as the Low and Medium ISEC groups had very similar probabilities of repeating a year. In the Spanish context, where around a third of the school population repeat a year, this is not really surprising; with such a proportion, it would be unlikely that the middle class would be spared. So in light of the results of the longitudinal model, it seems more correct to say that in Spain, any child may end up having to repeat a year, except those from high socio-cultural status households.

Lastly, apart from the effect of social status, the longitudinal model identified two highly significant personal variables at T2, school grades and academic effort. In other words, the two fundamental criteria used by teaching teams to propose repetition. In this regard, the model offers a picture that is consistent with what one would expect (Carabaña, 2011).

These details should not hide the fact that our study's overall conclusion is concerning. In Spain, given the same levels of learning difficulties, levels of effort, and other sociodemographic characteristics, social class has a different impact on teachers' proposals for repetition. This should invite reflection about the context these decisions are made in and the consequences for equality in the system. Repetition is categorised as an extraordinary attention to diversity measure. However, something that affects 30% of students

should not be considered so extraordinary. Our results reiterate the need to make such decisions cautiously in order to not contribute to increasing inequality in terms of accessing and remaining in the education system, or, as our data suggest, not reproducing the privileged situation of the minority with the highest socio-cultural status.

Finally, the data from our study must be interpreted in light of various limitations. Firstly, the two measurements were taken four school years apart. Having an intermediate timepoint would have allowed better monitoring of schooling pathways. Such a long time between the two timepoints may have allowed variations to be introduced that could have affected the results (Kretschmann et al., 2019). In addition, although the set of adjustment variables was relatively large, there were no specific measures of cognitive abilities and social relationships, and it was therefore impossible to know any effects of these types of variables, which seem to modulate the relationship between repetition and social status (Duran-Bonavila et al, 2024; Wu et al., 2010). Furthermore, the socio-emotional measures used in the study (self-concept and effort) were self-reported by the students, with all of the items worded positively. This means being unable to discount acquiescence bias in the socio-emotional scores (Hernández-Dorado et al., 2025; Primi et al., 2019). To address these limitations, future studies on repetition in Spain will need to use specific study designs that include following cohorts throughout their schooling and repeated measures pre- and post- repetition. This means designs using matched samples or some quasi-experimental approach (regression discontinuity, methods based on instrumental variables, or difference-in-difference analysis) and connecting repetition with medium- to long-term results, such as early dropout from education or employment outcomes.

In countries with high rates of repetition, such as Spain, there is a *culture of repetition*—the shared belief that repetition is a good thing (European Education and Culture Executive Agency, 2011). However, the evidence indicates that it has a high social and economic cost, without clear academic benefits (Goos et al., 2021). In any case, having evidence will not automatically change teaching practice (IVEI, 2009), meaning that more equitable and effective alternatives are required (Consejería de Educación del Principado de Asturias, 2016). To bring the Spanish education system into line with international rates of repetition (e.g., OCDE, 2016), five strategies have been proposed, which will be particularly beneficial to the more vulnerable students (Fernández-Alonso et al, 2022). First, change repetition to match the exceptional nature current legislation describes it as having—current legis-

lation has removed a set number of failed courses as criteria for automatic repetition and instead promotes collective decision-making based on how important the failed subjects are and expectations for recovery and success in the next school year. It is also essential to reinforce early detection of academic difficulties, through individualised alert and support systems, avoiding the situation of poor performance leading to repetition, especially in secondary education, where the measure in most cases is not used for prevention. Thirdly, teachers should use teaching methods that are adapted to diversity, such as differentiated teaching and cooperative learning, together with expanded programs for educational reinforcement, specialist tutors, and extra-curricular resources. Teacher training needs to prioritise formative assessment and inclusive teaching so that the response to diversity is not repetition. Finally, there needs to be flexibility in the curricular structure and the organisation in schools, allowing schooling to be tailored and adaptive advancement for students.

Supplementary Material

This paper has online supplementary material, which provides details of the PSM analysis (comparison of matching algorithms, evaluation of balance, and code examples): <https://osf.io/nq7c3/files/osfstorage>

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Repetition undermines social inclusion at school

La repetición perjudica la inclusión social en la escuela

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Abstract

Regardless of other possible effects, grade repetition forces students to disconnect from their friends in class and connect with their new classmates. This study quantifies how grade retention affects students' social integration. To analyze short-term effects, we use a propensity score matching to compare retained students with their "statistical twins". For long-term effects, we compare current repeaters with those who repeated in the past. The results are not optimistic. In the short term, retained students are less popular, have more enemies and fewer "good" friends in the classroom. They are also more likely to appear in hate networks. In the long term, 'former' retained students are slightly more popular than current students, but in all other respects they remain the same. We conclude that grade retention has a strong negative impact on students' social relationships, and that this effect hardly diminishes over time.

Keywords: Adolescents, social networks, grade retention, school vulnerability, social inclusion, social behaviour, education system.

Resumen

Independientemente de otros posibles efectos, la repetición de curso obliga a los estudiantes a desconectar de sus amigos de la clase y a conectar con sus nuevos compañeros de clase. Este trabajo cuantifica como la repetición tiene implicaciones en la integración social de los estudiantes. Para mirar los efectos de corto plazo, empleamos el método de emparejamiento por puntuaciones de propensión para comparar al repetidor con un "gemelo estadístico". Para el largo plazo, comparamos repetidores actuales con otros que lo hicieron

anteriormente. Los resultados no son optimistas. En el corto plazo, los repetidores son menos populares, tiene mayor número de enemigos y menos “buenos” amigos dentro de la clase. Además, aparecen con mayor frecuencia en las redes de odio. En el largo plazo, los repetidores “antiguos” son algo más populares que los actuales, pero en todo lo demás son iguales. Podemos concluir que la repetición tiene un impacto muy negativo en las relaciones sociales de los estudiantes y que dicho efecto apenas se aminora con el paso del tiempo.

Palabras Clave: Adolescentes, redes sociales, repetición de curso, vulnerabilidad escolar, inclusión social, comportamiento social, sistema educativo.

Introduction

One of the most pressing issues in the Spanish education system is the high rate of grade repetition. According to the Education at a Glance 2024 report, Spain has a repetition rate of 7.8% in lower secondary and 6.5% in upper secondary education, whereas the average for OECD countries is less than half those figures (2.2% and 3.2%, respectively). Grade repetition refers to a situation in which a student who has completed an academic year must remain at the same level for an additional year. It is important to note that the decision to repeat a grade rarely originates from the student’s environment but is instead made collectively by the school’s teaching staff. According to Royal Decree 984/2021, repetition is considered an exceptional measure, permitted at most twice during the stage, and must always be based on an evaluation of the student’s progress and their ability to acquire essential learning outcomes.

According to statistics published by the Ministry of Education, Vocational Training and Sports (MEFPD, 2024), based on data from the 2022–2023 academic year, 7.3% of first-year students in compulsory secondary education (ESO) repeated the grade, along with 6.8% in the second year, 7.3% in the third, and 6.7% in the fourth. In every year, the percentage of male students repeating is consistently higher than that of female students. Particularly striking is the proportion of boys repeating the first year of ESO, which reaches 8.7%, compared to 5.8% among girls.

Although the number of students repeating a grade is high, there are many reasons to question whether this policy has any real benefits. On the one hand, staying in the same grade for an additional year seems to have, at best,

uncertain effects on academic performance. One might expect that grade repetition would promote learning - consolidating knowledge and allowing for a better match between students' abilities and the level of instruction. However, the evidence suggests that this is not the case and that it may even reduce academic achievement (García Pérez et al., 2014).

Second, these potential benefits appear to come at a high personal cost for the student: stigma from teachers or classmates, a decrease in self-confidence, and difficulty adjusting to a new peer group (see Manacorda, 2012). Indeed, there is causal evidence that grade repetition increases the likelihood of early school dropout (Jacob and Lefgren, 2009; Manacorda, 2012; De Witte et al., 2013; Freeman and Simonsen, 2015; González-Rodríguez et al., 2019).

Finally, grade repetition imposes a significant financial cost on institutions, which must fund an extra year of schooling for the repeating student. This additional year also imposes an economic cost on the student, as it delays entry into the labor market and thus the start of earning labor income (Tafreschi and Thiemann, 2016).

Research on grade repetition has focused almost exclusively on academic aspects, such as the educational performance of repeaters or the factors associated with a higher likelihood of repeating a grade (see, for example, González-Rodríguez et al., 2016; González-Betancor et al., 2019; López et al., 2023; and Nieto-Isidro et al., 2023). It is somewhat surprising that little effort has been made to study how repetition affects students' social integration. After all, when students are required to repeat a grade, they are separated from their classroom friends and forced to interact with a new group of peers. This is unlikely to come at no cost.

In this study, we focus precisely on this issue: the cost of grade repetition in terms of students' social integration. By social integration, we refer to the number of friends (popularity), centrality, and clustering of each student (whether they are repeaters or not). To conduct this analysis, we use the TeensLab dataset (Vasco et al., 2025), which contains information on more than 5,000 secondary school students. This dataset covers multiple dimensions of students' cognitive and non-cognitive skills, as well as measures of academic outcomes—such as grades—and other essential aspects such as the students' future orientation (patience) and their tolerance or preference

for risk. In some of the TeensLab schools (although not all), students were also asked whether they were currently repeating a grade or had repeated one in the past. In fact, the proportion of students currently repeating stands at 9.54%, a figure consistent with that reported by MEFPD (2024).

In addition, TeensLab provides the individual network measures mentioned earlier and, more importantly, contains information from over 200 independent classroom networks. As we will see later, the network measures are computational calculations with no subjective component; they simply assign a numerical value to each variable of interest. In other words, network analysis tells us not whether a student feels more or less isolated, but whether they are actually more isolated, regardless of whether they perceive it or are even aware of it.

This study aims to answer two research questions. First, we measure the effect of grade repetition on students' social integration. Second, we examine whether this effect persists over time or fades after a few years.

To address the first research question, we compare network measures between repeaters and non-repeaters. To avoid obvious endogeneity problems—since repeaters are inherently different from non-repeaters by virtue of repeating—we use a statistical technique known as *propensity score matching* (hereafter, PSM). This method allows us to search within the TeensLab dataset for statistical “twins” of the repeaters—that is, students who are statistically similar to repeaters in certain characteristics except for the fact that they have not repeated a grade. The matching is based on variables that are both observable and unobservable to teachers (such as patience, risk aversion, and cognitive skills), all measured in TeensLab. This approach enables us to isolate the “causal” effect of repeating on the outcome variables, as it compares comparable samples. It is also important to note that, by comparing repeaters to their classmates, we are capturing the immediate (short-term) effect of repetition.

To address the second research question, we compare students who are currently repeating a grade with students who repeated a grade in the past. In other words, both groups share the stigma of having repeated—only that some are experiencing it now, while others experienced it previously. As we will see throughout the paper, these two groups exhibit similar observable

characteristics, allowing us to assume they are comparable and that any differences in social integration measures can be attributed to the effect of currently repeating. This second analysis enables us to assess whether the effects of grade repetition persist over time.

Method

Social Integration and Network Metrics

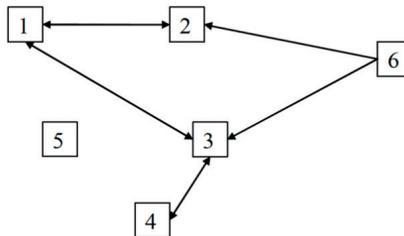
The study of relationships between students in the classroom is not a new topic. Sociograms were first used in the United States in the 1930s and have since been widely employed, particularly to identify patterns of interaction, detect conflicts, and improve classroom dynamics. As we will see throughout this section, the unidirectional metric (which refers to one student nominating another) is relatively simple. However, the metric that captures interactions between students—for example, the shortest (or longest) path between two individuals—can be quite cumbersome. Interested readers are encouraged to consult the book by Jackson (2010) and the collection of papers edited by Bramoullé et al. (2016). They may also refer to the work of Ruiz-García et al. (2023) on the creation of an index for triadic relationships, that is, how the third friend of a pair of friends becomes connected to the other.

What is a network? Let us consider any given classroom where many students have relationships with one another, but not necessarily with everyone. Suppose that each student i declares which classmates from the set C are their friends. We will call A_i the set of friends of student i , and the “super” set of all declared friendships will be referred to as the *friendship network*: $(\{A_i\}_{i \in C}, C)$, where $a_i = |A_i|$ represents the number of friends that student i has within the class. It is important to note that, unless a student is friends with the entire class, we will necessarily have $a_i < C - 1$.

This setup implies that there will be classmates who are “strangers” to student i —that is, they do not belong to their set of friends: $E_i = C \setminus A_i$. With these two definitions—friends and strangers—in hand, we can illustrate an example of a network. Imagine a small class with only six students, where

each of them has their own set of friends: $A_1 = \{2, 3\}$, $A_2 = \{1\}$, $A_3 = \{1, 4\}$, $A_4 = \{3\}$, $A_5 = \emptyset$, $A_6 = \{2, 3\}$.

FIGURE I. Example of a Network with Six Students



Source: Compiled by the authors.

Figure I illustrates a common phenomenon in networks. Students 1 and 2 nominated each other - $A_1 = \{2, 3\}$, $A_2 = \{1\}$ - so student 1's set of friends includes 2, and student 2's set includes 1. However, this is not the case with student 6 - $A_6 = \{2, 3\}$ - who declared 2 as a friend, but was not listed as a friend by student 2. This *lack of reciprocity* in friendships is quite common: one student may consider another a friend, while the feeling is not reciprocated.

When we examine networks such as those in TeensLab, we find that many relationships are not reciprocal but are instead declared by only one of the two individuals. In other words, h considers j to be a friend, while j sees the relationship differently. Thus, the sets A_i represent the friends declared by each student i , but these relationships are not necessarily reciprocal. In fact, student i may appear in the friendship sets of other students who are not part of their own set of friends (as in the previous example between students 2 and 6).

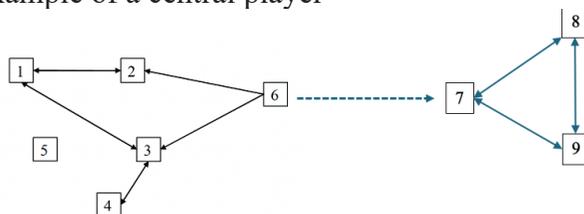
Out-degree and Popularity (in-degree). When we refer to *out-degree*, we mean the number of elements in the set of friends declared by each student, $a_i = |A_i|$. In contrast, *in-degree*, denoted as d_i , refers to the number of students (other than i) in the class C who include subject i in their set of friends. In other words, *out-degree* indicates how many friends a student nominates, while *in-degree* indicates how many students nominate him. It is important to note

that d_i can range from a minimum value of 0 (no one nominated the student as a friend—as with student 5 in Figure II) to a maximum value of $C-1$ (the entire class except themselves).

In the network literature, *in-degree* is commonly referred to as *popularity*. We focus on *in-degree* because it is a variable that the student cannot manipulate, as it depends on others rather than on themselves. This is particularly relevant because it helps eliminate endogeneity concerns.

What is centrality? Centrality refers to connectivity. Some students in a class are capable of linking subgroups (*clusters*) that, in their absence, would remain independent networks. In Figure II, we revisit the network from Figure I and add a new cluster composed of three students, all of whom are friends with one another: $A_7 = \{8, 9\}$, $A_8 = \{7, 9\}$, $A_9 = \{7, 8\}$. If student 6 becomes friends with student 7, the two previously separate networks merge into a single network. It is important to emphasize that the role of student 6 is critical: if, for any reason, their connection with student 7 is broken, the network will split back into two disconnected groups. For this reason, individuals who occupy central positions are referred to as *key players* (see Ballester et al., 2006).

FIGURE II. Example of a central player



Source: Compiled by the authors.

Unfortunately, there is no a single definition of centrality; on the contrary, there are many—such as centrality, eigenvector, rank, and others. In this study, we use a very common metric: *betweenness*. For simplicity, we will say that a person is more central if they have a greater ability to connect others, and less central if their capacity to connect others is lower. If we think about all the possible connections in the network from Figure II—for example, between 1 and 2, 1 and 3, ..., 1 and 6; 2 and 1, 2 and 3, ..., 2 and 6; and so on—

the most central student will be the one who appears most frequently along those paths. Another way to explain it is that one person is more central in the network than another if the removal of the former causes greater disruption to the network than the removal of the latter.

The TeensLab Database

TeensLab is a consortium formed by the Universities of Barcelona, Carlos III, Granada, Loyola, and the Basque Country, aimed at studying economic behavior among adolescents in Spain. There is evidence showing that these skills (both cognitive and non-cognitive) are important determinants of real-life decision-making in adulthood and are correlated with variables typically associated with “positive outcomes” such as education, savings, and others (see Dohmen et al., 2011; Golsteyn et al., 2014; Falk et al., 2018; Angerer et al., 2023).

The TeensLab project gathered data from 5,890 students across 33 educational centers located in two Spanish regions: Andalusia and Catalonia. Data collection was conducted with the consent of school principals and followed strict standards of anonymity and confidentiality. The methodology combined surveys with *lab-in-the-field* experiments. The main dimensions captured in the dataset include: (i) economic preferences (regarding risk and time), (ii) cognitive skills, (iii) strategic thinking, and (iv) network metrics at the classroom level. In addition, the dataset contains variables related to students’ sociodemographic characteristics, as well as a range of complementary measures on physical appearance, mood (happiness), expectations, and other aspects.

The design of the experiment included several specific features. First, it was implemented as a classroom activity in each school to maximize response rates (see Alfonso et al., 2023) and was conducted through an online platform, SAND (Social Analysis and Network Data), to guarantee data protection. Second, students completed the experiment using tablets, which allowed them to read the instructions independently, proceed through the questionnaire sequentially without the possibility of returning to previous screens, and respond to the survey.

Third, the entire questionnaire was administered in Spanish, and due to restrictive school policies, hypothetical (rather than real) incentives were used in the experimental tasks. However, prior evidence shows that the behavior of both adolescents and adults does not differ between real and hypothetical payment schemes, at least for risk and time preferences, supporting the reliability of the results (Brañas-Garza et al., 2021, 2023; Alfonso et al., 2023).

Finally, the sample includes students aged between 10 and 23 years (Mean = 14.10, SD = 1.94), covering various educational levels: primary education (8.62%), lower and upper secondary education (84.94%), high school (1.90%), and vocational training (4.53%). The sample is balanced by gender: 49.68% identify as female, 49.68% as male, and the remaining 0.64% as “other” or “prefer not to say”.

Vasco et al. (2025) provides a detailed description of the database. The complete dataset is publicly available at the following link: <https://github.com/teenslab/datateenslab>.

This study uses data from 1,821 students. This number is smaller than the full TeensLab dataset for two reasons. First, we focus exclusively on students enrolled in compulsory secondary education (ESO), which yields a sample of 5,003 students. Second, the question regarding whether a student is currently repeating or had previously repeated a grade was included in only 11 schools, resulting in a subsample of 2,155 ESO students for whom this information is available. As explained below, we ultimately work with 1,821 observations after excluding 129 students who repeated more than a year ago and 205 students with missing values in key variables. The next section presents the empirical strategy and the data used in this article.

Variables definition, empirical strategy and estimation method

To answer the research questions posed in this study and provide some causal evidence, it is necessary to apply different empirical strategies. Endogeneity arises when an explanatory variable is correlated with the error term in a regression model. This leads to biased and inconsistent estimates of the causal effect of grade repetition on the outcome variables.

Endogeneity can arise for several reasons, but in our case two stand out: (i) omitted variables, where other factors - such as family background, personal motivation, or school quality - may affect both the likelihood of repeating a grade and the student's social integration; and (ii) simultaneity or reverse causality, where social integration itself may affect the likelihood of repeating (students with lower levels of social integration may be more likely to repeat). To avoid these problems, we use different subsamples that are comparable and allow us to draw more reliable conclusions.

We perform two separate analyses. First, we compare current repeaters with non-repeaters who have a similar profile. To do this, we use a statistical technique known as propensity score matching (PSM) with a kernel-based matching approach (KPSM). The basic idea behind this method is that for each observation in the treatment group (students who are currently repeating a grade), we find a "statistical twin" in the control group (students who are neither currently repeating nor have repeated in the past). This allows us to create a counterfactual that helps us estimate the effect of grade repetition on the relevant outcome variables.

Second, we compare students who are currently repeating to those who have repeated in the past. Obviously, this sample is smaller, but it remains highly informative because we are comparing individuals who effectively share a key characteristic: having repeated a grade.

Before presenting the empirical strategy, we describe the variables used in this study. The TeensLab dataset provides information on students' age, gender, academic performance, and whether the student or their parents were born abroad (migrant status). It also includes measures of cognitive skills (using the Cognitive Reflection Test, CRT; see Brañas-Garza et al., 2019a; Frederick, 2005; and Thomson and Oppenheimer, 2016), patience, and risk tolerance. The patience measure is based on Alfonso et al. (2023), and the risk tolerance measure on Vasco and Vázquez (2025). Appendix B describes these tasks in detail.

Patience and risk tolerance are included as control variables because they help capture unobservable characteristics. There is strong evidence that patience is associated with perseverance and tends to correlate with better academic outcomes (see Brañas-Garza et al., 2019b, for a review). Risk toler-

ance, in turn, is associated with a wide range of behaviors, from entrepreneurship to alcohol consumption (see Dohmen et al., 2011, for a review).

Table I presents a summary of the variables. It is important to note that the variables for academic performance, patience, and risk tolerance were standardized using the min-max method, transforming them into a range from 0 to 1, where higher values indicate a higher level in each characteristic.

TABLE I. Summary Statistics of Matching and Outcome Variables

	N	Mean	SD	Min	Max
<i>Control and matching variables</i>					
<i>Repeaters</i>	1821	0.04	0.20	0	1
<i>Female</i>	1821	0.49	0.50	0	1
<i>CRT</i>	1821	0.50	0.27	0	1
<i>GPA</i>	1821	0.63	0.40	0	1
<i>Patience</i>	1821	0.48	0.35	0	1
<i>Risk</i>	1821	0.60	0.16	0	1
<i>Age</i>	1821	14.24	1.14	10	18
<i>Migrant</i>	1821	0.21	0.41	0	1
<i>Outcome variables</i>					
<i>In-degree friends</i>	1821	8.12	3.85	0	21
<i>In-degree best friends</i>	1821	2.93	2.01	0	11
<i>In-degree enemies</i>	1821	2.34	2.50	0	22
<i>In-degree worst enemies</i>	1821	0.70	1.27	0	12
<i>Out-degree friends</i>	1821	9.00	6.30	0	30
<i>Out-degree best friends</i>	1821	3.20	2.90	0	28
<i>Out-degree enemies</i>	1821	2.80	3.61	0	29
<i>Out-degree worst enemies</i>	1821	0.82	1.63	0	29
<i>Betweenness friends</i>	1821	16.86	19.22	0	63.73
<i>Betweenness best friends</i>	1821	16.35	24.67	0	80.14
<i>Betweenness enemies</i>	1821	10.55	18.68	0	62.67
<i>Betweenness worst enemies</i>	1821	0.76	2.11	0	8
<i>Clustering friends</i>	1821	0.68	0.19	0	1
<i>Clustering best friends</i>	1821	0.52	0.34	0	1

<i>Clustering enemies</i>	1821	0.23	0.29	0	1
<i>Clustering worst enemies</i>	1821	0.06	0.19	0	1

Source: Compiled by the authors using data from TeensLab.

Additionally, the bottom panel of Table I presents the outcome variables used to measure social integration, covering four dimensions: *In-degree*, *Out-degree*, *Betweenness*, and *Clustering*. *In-degree* is defined as the number of classmates who identify the student as a friend (i.e., a measure of the student's popularity), whereas *Out-degree* corresponds to the number of peers the student names as friends. *Betweenness* indicates how central (or important) the student is within the class network, and *Clustering* measures the extent to which the student's friends are also friends with one another. We conduct all analyses separately for each type of relationship: friends, best friends, enemies, and worst enemies. Appendix A shows the interface that each student uses to indicate their friends (and enemies), providing the information necessary to calculate all these variables.

We now proceed to explain the empirical strategy used to measure the short- and long-term effects of grade repetition.

Comparison between current repeaters and non-repeaters

The main challenge in comparing repeaters and non-repeaters is that these groups may differ in aspects such as academic performance, patience, risk tolerance, and other characteristics. If these differences are not controlled for, any direct comparison could lead to spurious conclusions, as observed effects on social integration could be driven by other factors rather than by repetition itself. To address this issue, propensity score matching (PSM) estimates the probability that a student will repeat a grade (the propensity score) based on a set of individual characteristics. Each repeater is then matched to non-repeaters with similar propensity scores, ensuring that the groups are comparable.

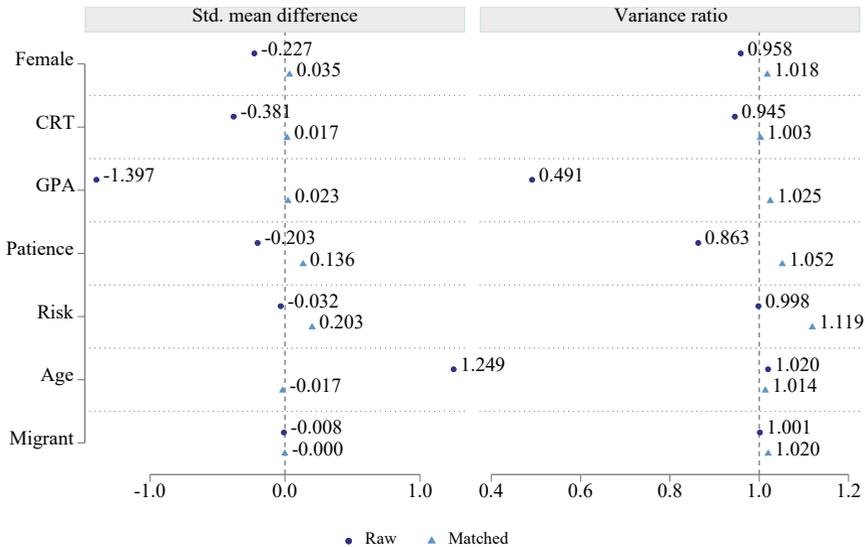
To estimate the propensity score, we use the variables listed at the top of Table I. Additionally, we apply exact matching on migrant status, CRT score, age, and average grade (GPA). This ensures that each repeater is only compared with non-repeaters who match exactly on these key characteristics.

There are different ways to perform matching. A common method is to assign each repeater a single non-repeater with the closest propensity score (1-to-1 matching). However, this approach can be inefficient, as it discards information and may produce less stable estimates. Instead, we use Kernel matching, which weights multiple non-repeaters with similar propensity scores, assigning greater weight to those who are closer. This reduces variance and improves the precision of the estimates. All analyses were conducted using the *kmatch* package in Stata (see Jann, 2017, for a detailed description).

To verify that the matching procedure has produced a valid comparison group, we perform three key diagnostic tests:

- #1 – *Mean differences before and after matching* (Figure III, left panel). Before matching, repeaters and non-repeaters show significant differences across several characteristics. These differences, represented by circles, refer to the raw data. However, after matching, these differences disappear or are greatly reduced in the matched data, represented by triangles, indicating that the groups have been properly balanced.

FIGURE III. Mean differences and variance ratio: Repeaters vs. non-repeaters.

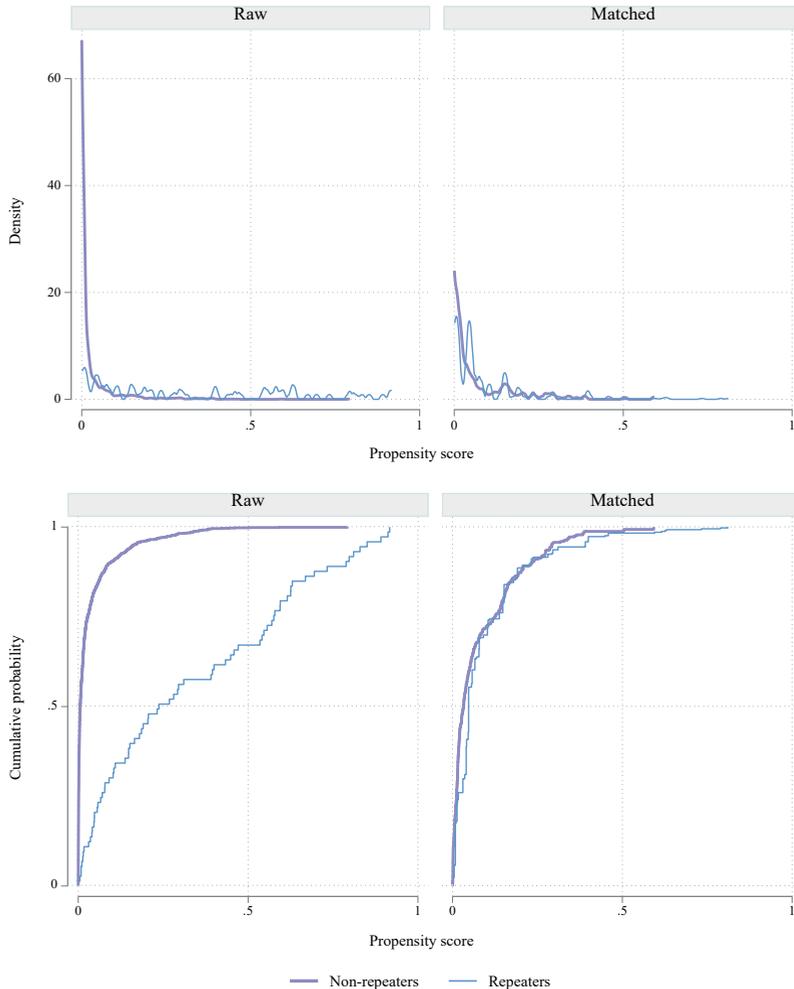


Source: Compiled by the authors based on data from TeensLab.

- #2 – *Variance ratio between repeaters and non-repeaters* (Figure III, right panel). Effective matching requires balancing not only means but also the variance of covariates. The right panel of Figure III shows that, prior to matching, the variance of key characteristics differed substantially between repeaters and non-repeaters (represented by circles). After matching, most variance ratios converge toward 1 (represented by triangles), indicating that the distributions of covariates are now similar across groups.
- #3 - *Distribution of the propensity score before and after matching* (Figure IV). The top panel displays the distribution of the propensity score, while the bottom panel shows its cumulative distribution. Both panels illustrate that, prior to matching (left panel, “Raw Data”), the distributions of repeaters and non-repeaters were quite different. After matching (right panel, “Matched Data”), the distributions become much more similar, indicating adequate com-

mon support. This suggests that there are sufficient non-repeaters with comparable characteristics to the repeaters, allowing for valid comparisons.

FIGURE IV. Distribution (top) and cumulative distribution (bottom) of the propensity score.



Source: Compiled by the authors based on data from TeensLab.

Since the diagnostic tests indicate good balance in the means of the control variables, variance ratios close to 1 (indicating balanced dispersion), and adequate common support, we conclude that the Kernel-based PSM procedure has successfully produced a comparable control group. This allows us to credibly estimate the causal effect of grade repetition on social integration outcomes by comparing repeaters with a well-defined group of non-repeaters.

To estimate the effect, we compute the difference between the mean outcome for repeaters and a weighted average outcome for non-repeaters, where weights are based on the estimated propensity scores. This procedure identifies the Average Treatment Effect on the Treated (ATT)—the causal impact of grade repetition on students who actually repeated—rather than the Average Treatment Effect (ATE), which would reflect the effect if repetition were applied to all students. The estimated immediate effect of repetition on each outcome variable is thus:

$$\widehat{ATT} = \frac{1}{N_{D=1}} \sum_{i|D=1} \left[Y_i - \sum_{j|D=0} w_{ij} Y_j \right] \quad (1)$$

where $N_{D=1}$ is the total number of individuals currently repeating a grade ($D=1$); Y_i denotes the outcome for individual i in the treatment group (repeaters) and Y_j denotes the outcome for individual j in the control group, that is non-repeaters ($D=0$); and w_{ij} is the weight assigned to individual j in the control group to match him or her to treated individual i . In addition, when estimating the ATT, we include school fixed effects to control for idiosyncratic differences across schools (e.g., differences in grade repetition policies).

Finally, although Kernel-based PSM significantly reduces selection bias, it does not guarantee perfect causal identification, as there may still be unobserved factors that influence both grade repetition and social integration (e.g., personal motivation or family support). Nevertheless, within the set of observational methods, Kernel PSM provides a robust strategy for generating a valid comparison between repeaters and non-repeaters.

Comparison between current repeaters and former repeaters

To estimate whether grade repetition has a lasting effect over time, we focus on the sample of repeaters. However, unlike the previous section, we do not compare them to matched synthetic twins but rather to other students who also repeated, distinguishing between those who are currently repeating and those who repeated in prior years. As shown in Table II, the sample includes 203 repeaters: 74 students who were repeating at the time of the experiment and 129 students who had repeated in the past. Table II also shows that there are no significant differences between these groups in terms of gender (female), GPA, CRT score, patience, risk tolerance, age, migrant status, or whether they repeated more than once.

The only significant difference ($p < 0.01$) between the two samples is found in academic performance (GPA), where current repeaters have lower average grades than those who repeated a year or more ago. This result is expected, as the questions on academic performance refer to the previous school year, and current repeaters, by definition, had lower grades in that period.

In summary, the two subsamples are comparable across almost all observable variables, allowing us to assume similarity in unobservable characteristics as well. Under this identification assumption, we can estimate the lasting effect of grade repetition using a multiple linear regression model. Specifically, we estimate the following model by Ordinary Least Squares (OLS) for each outcome variable $q = \{In-degree, Out-degree, Betweenness, Clustering\}$:

$$Y_{is}^q = \beta_0 + \beta_1 * R_i + \theta^c * X_i^c + \tau_s + \epsilon_i \quad (2)$$

where Y_{is}^q denotes the outcome variable q for each individual i in school s ; R_i equals 1 if student i is currently repeating and 0 if he/she repeated in a previous year; X_i^c is a vector of control variables $c = \{Female, CRT, GPA, Patience, Risk, Migrant\}$; τ_s represents school fixed effects; and ϵ_i is the error term. Robust standard errors are used to account for heteroskedasticity. The estimated long-term effect of grade repetition is captured by the coefficient $\hat{\beta}_1$.

TABLE II. Differences in observable variables: Current vs. former repeaters.

	Repeat		Difference (2) – (1)
	≥1 year	Now	
	(1)	(2)	
Female	0.442 (0.499)	0.378 (0.488)	-0.063 (0.072)
CRT	0.360 (0.262)	0.405 (0.266)	0.045 (0.039)
GPA	0.311 (0.354)	0.180 (0.273)	-0.131*** (0.048)
Patience	0.483 (0.334)	0.414 (0.321)	-0.068 (0.048)
Risk	0.618 (0.178)	0.592 (0.164)	-0.026 (0.025)
Age	15.411 (1.275)	15.575 (1.117)	0.164 (0.180)
Migrant	0.198 (0.400)	0.216 (0.414)	0.018 (0.059)
Multiple repetition	0.132 (0.340)	0.162 (0.371)	0.030 (0.051)
Observations	129	74	203

Source: Compiled by the authors based on data from TeensLab. Note: Standard errors in parentheses. The *Difference* column tests for equality of means and asterisks denote significance levels: *** $p < 0.01$; ** $p < 0.05$ y * $p < 0.10$.

Results

Following the structure of the paper, we divide the results into two sections. First, we compare current repeaters with non-repeaters who share similar

characteristics—that is, their “statistical twins.” Second, we compare current repeaters with students who repeated in the past. All the analyses were conducted using Stata 18.

Comparison between current repeaters and non-repeaters

In this section, we compare students who are currently repeating a grade with the rest of their classmates who are not repeaters. Figure V presents the ATT estimates for each outcome variable, using the Kernel PSM methodology described earlier.

Panel A shows that repeaters are less popular than their classmates ($p < 0.05$), and the negative effect is even stronger ($p < 0.01$) when considering best friends. Interestingly, they are more popular in enemy networks ($p < 0.01$), although no differences are observed for worst enemies.

Panel B shows that repeaters nominate a similar number of friends as their peers, but they report significantly fewer best friends ($p < 0.01$). No significant differences are found in the number of enemies nominated. In addition, panel C reveals no substantial differences in overall centrality—repeaters are neither more nor less central in the classroom network. However, they do appear to be more central in enemy networks ($p < 0.05$).

Regarding *clustering*, panel D highlights two important findings. First, repeaters are less likely to be embedded in cohesive groups of best friends ($p < 0.05$)—that is, their best friends are less likely to be connected to each other. Second, repeaters are more likely to appear in tightly connected clusters of enemies, where all members report considering them an enemy ($p < 0.05$). All estimates and robust standard errors are reported in Table A1 in Appendix C.

We summarize the findings as follows:

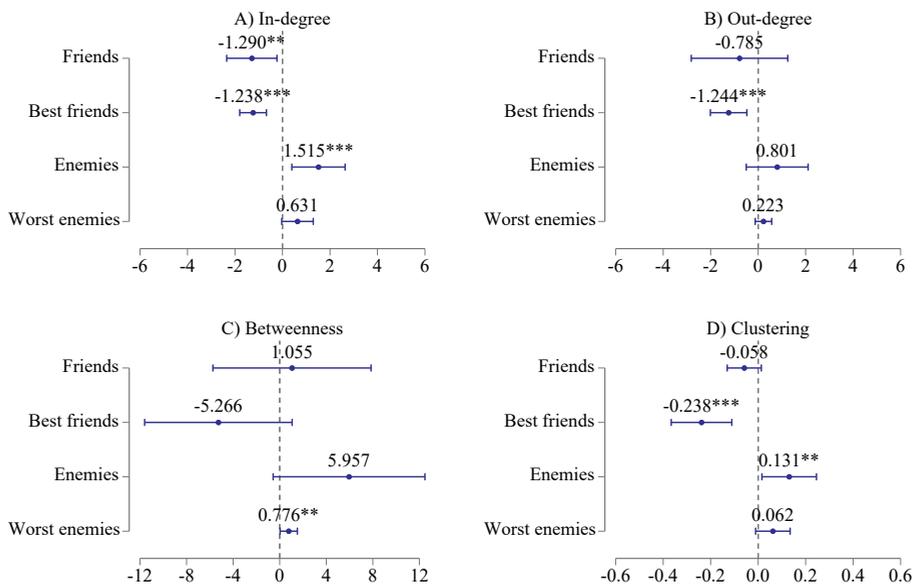
Result 1: Repeaters are less popular, have more enemies, and report fewer best friends in the class. Moreover, they appear more frequently in enemy networks and have enemies who are friends with one another.

These results are particularly relevant because the comparison group

for repeaters consists of statistical twins -that is, individuals who are identical in all observed characteristics except for having repeated a grade. While the Kernel PSM method does not provide definitive causal identification -since those who repeated actually did so, and those who did not were never exposed to the treatment - we can assume that the matched twins are so similar that the decision to repeat can be regarded as quasi-random.

In this context, we can think of repetition as the result of a process that is, to some extent, random: among a set of very similar students, some ended up repeating due to bad luck, while others did not. Under this assumption, we interpret the results as showing that grade repetition significantly damages students' social capital—in other words, their social integration is substantially reduced.

FIGURE V. ATT of grade repetition based on Kernel PSM, with 95% confidence intervals.



Source: Compiled by the authors based on data from TeensLab. School fixed effects are included in the estimation.

Comparison between current repeaters and former repeaters

In the previous section, we showed that grade repetition has a negative impact on social integration, but we do not yet know how long this impact lasts—in other words, whether students recover their social capital one or more years after repeating. To address this question, we examine differences between students who are currently repeating and those who repeated in a previous year. Importantly, the measure of social inclusion refers to the time at which the data were collected. That is, all individuals in this analysis carry the stigma of having repeated a grade, but some are experiencing it now, while others experienced it in the past.

Figure VI displays the estimated coefficient $\hat{\beta}_i$ for each outcome variable, based on the multiple linear regression model described above. In Panel A, we find that students who are currently repeating are less popular ($p < 0.05$) than those who repeated in the past. A similar effect is observed for best friends ($p < 0.05$). No significant differences are found in enemy networks.

We also find no effect on out-degree (Panel B): students who are currently repeating do not nominate more or fewer friends (or enemies) than those who repeated in the past. Likewise, we observe no substantial differences in centrality (Panel C), nor any significant impact on clustering (Panel D). For a more detailed presentation of the results, Tables A2 through A5 in Appendix C report the full regression estimates, both with and without controls, for each outcome variable.

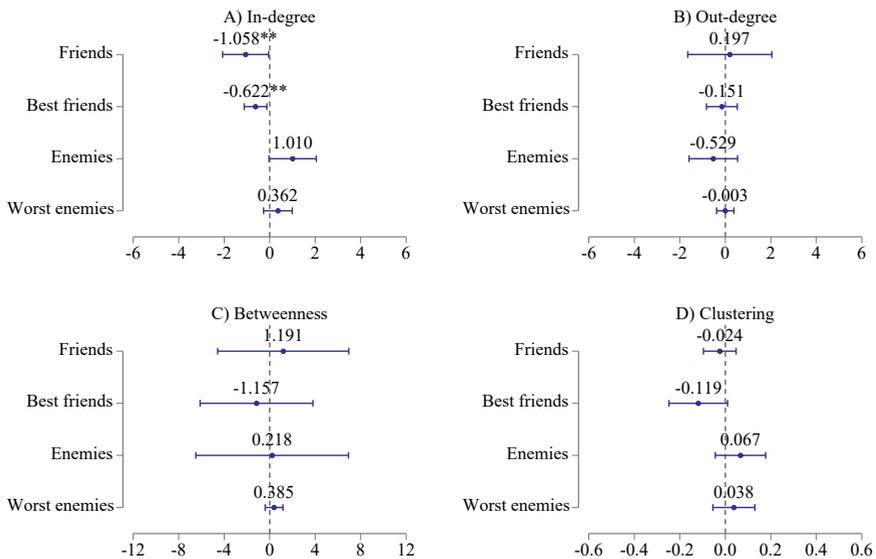
In summary:

Result 2: Compared to students who repeated in the past, current repeaters are less popular in friendship networks. No significant differences are found in out-degree, centrality, or clustering.

Although we cannot -and should not- draw strong conclusions from a relatively small sample ($n = 203$), the evidence is nonetheless concerning. Result 2 shows that the only meaningful difference between former and current repeaters is that the latter are less popular. This suggests that the negative

effect of repetition on popularity is not permanent and tends to fade over time. Apart from this, former and current repeaters are virtually identical across all other outcome variables.

FIGURE VI. Current vs former repeaters, multiple linear regression model with 95% CI.



Source: Compiled by the authors based on data from TeensLab. School fixed effects are included.

This implies that, except for (un)popularity—which appears to recover one or more years after repeating—all other patterns described in Result 1 remain unchanged: repeaters continue to have more enemies, fewer close friends, and are more frequently embedded in hostile networks. In short, the negative effects of grade repetition on students’ social integration persist over time.

Conclusions

Grade repetition in Spain is a longstanding issue which, although it has improved slightly, remains unresolved. The country continues to show alarmingly high rates compared to other OECD countries.

Existing research raises serious concerns about the actual benefits of grade repetition for students, as there is little evidence of improvements in academic performance (García Pérez et al., 2014). By contrast, there is clear evidence of direct costs, such as stigmatization—both by peers and sometimes by teachers—and reduced self-confidence (see Manacorda, 2012). There is even causal evidence suggesting that repetition increases the likelihood of school dropout (Jacob and Lefgren, 2009; Manacorda, 2012; De Witte et al., 2013; Freeman and Simonsen, 2015; González-Rodríguez et al., 2019).

It is also important to remember that maintaining a repetition rate of around 10% imposes a substantial cost on the education system. These costs are not only economic but also logistical, as schools must accommodate more students in classrooms that, by design, lack flexibility. In addition, repetition imposes a financial burden on students themselves, as it delays their entry into the labor market and, consequently, the point at which they begin earning income (Tafreschi and Thiemann, 2016).

This study explores a previously understudied consequence of grade repetition. Using network metrics and data from the TeensLab project (Vasco et al., 2025), we examine how repetition affects the social capital -or social integration- of students who repeat a grade. The analysis follows two complementary approaches: first, we compare repeaters with non-repeaters who share similar characteristics (their “statistical twins”); second, we compare them with other students who repeated in previous years.

To measure differences in network metrics between repeaters and non-repeaters, we use a statistical technique known as propensity score matching, which allows us to construct “statistical twins” and isolate the quasi-causal effect of repetition on social integration. Because we compare repeaters with their classmates, this analysis captures the immediate—or short-term—effect of repeating a grade.

The results are concerning. Repeaters are less popular, have more enemies, fewer close friends, appear more frequently in hostile networks, and have enemies who are friends with one another. In short, the short-term impact of repetition on students’ social capital is severe: they not only lose social

ties but also become targets within enemy networks.

To assess the long-term effects of grade repetition, we compare students who repeated in the past with those who are currently repeating. This comparison is meaningful because both groups share the stigma of having repeated a grade. The only difference is timing—some are repeating now, while others did so previously—which allows us to identify which effects persist over time.

When comparing former repeaters with current ones, we find a single difference: current repeaters are less popular. In all other outcome variables, the two groups are virtually identical. This suggests that, years after repeating, students may recover their popularity, but no substantial improvements are observed in other dimensions. In short, they still have fewer friends, more enemies, appear central in networks of hostility, and so on. That is, their relational capital does not significantly recover beyond the dimension of popularity.

Taken together, our findings suggest that grade repetition severely undermines students' social capital: repeaters tend to lose friends, accumulate more enemies, and occupy more central positions within enemy networks. Importantly, these effects appear to persist over time.

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Appendix

Appendix A: Network elicitation protocol in TeensLab

Marca tus amigas/os

1º ESO - D 1º ESO - C 1º ESO - B 1º ESO - A

<input type="checkbox"/> IRENE GARCIA CRESPILO - 1º ESO D	<input type="checkbox"/> ISABEL JURADOM CARDEÑOSA - 1º ESO D
<input type="checkbox"/> MANUEL ALONSOP ALONSOM - 1º ESO D	<input type="checkbox"/> ALFONSO ALMAGRO S - 1º ESO D
<input type="checkbox"/> JAIME CAROPEP RODRÍGUEZ - 1º ESO D	<input type="checkbox"/> IRENE GARCIA CRESPILO - 1º ESO D
<input type="checkbox"/> ISABEL JURADOM CARDEÑOSA - 1º ESO D	<input type="checkbox"/> MANUEL ALONSOP ALONSOM - 1º ESO D
<input type="checkbox"/> ALFONSO ALMAGRO S - 1º ESO D	<input type="checkbox"/> JAIME CAROPEP RODRÍGUEZ - 1º ESO D
<input type="checkbox"/> IRENE GARCIA CRESPILO - 1º ESO D	<input type="checkbox"/> ISABEL JURADOM CARDEÑOSA - 1º ESO D
<input type="checkbox"/> MANUEL ALONSOP ALONSOM - 1º ESO D	<input type="checkbox"/> ALFONSO ALMAGRO S - 1º ESO D
<input type="checkbox"/> JAIME CAROPEP RODRÍGUEZ - 1º ESO D	<input type="checkbox"/> IRENE GARCIA CRESPILO - 1º ESO D
<input type="checkbox"/> ISABEL JURADOM CARDEÑOSA - 1º ESO D	<input type="checkbox"/> MANUEL ALONSOP ALONSOM - 1º ESO D
<input type="checkbox"/> ALFONSO ALMAGRO S - 1º ESO D	<input type="checkbox"/> JAIME CAROPEP RODRÍGUEZ - 1º ESO D
<input type="checkbox"/> IRENE GARCIA CRESPILO - 1º ESO D	<input type="checkbox"/> ISABEL JURADOM CARDEÑOSA - 1º ESO D

Appendix B: Self-reported grade point average (GPA), CRT, Patience, and Risk elicitation.

Self-reported GPA

To measure GPA (grade point average), students were asked how many “sobresalientes” (equivalent to A+) and “notables” (equivalent to A) they had received in their three main subjects—mathematics, language, and English—during the previous academic year. A “sobresaliente” was assigned a value of 2 points and a “notable” to 1 point, and 0 otherwise, resulting in a GPA variable with a maximum of 6 points. To ensure comparability and avoid scale issues, the GPA was standardized using the min-max method, rescaling it to range from 0 to 1. Higher values on this scale indicate a greater number of top grades and, accordingly, stronger academic performance.

A continuación, vamos a preguntarte sobre tus **CALIFICACIONES** durante el **año pasado**.

¿Has obtenido algún SOBRESALIENTE (9 o 10) en el curso pasado?

<input type="checkbox"/> Sí
<input type="checkbox"/> No

¿En qué asignatura/s obtuviste sobresaliente? Puedes marcar más de una.

<input type="checkbox"/> Inglés
<input type="checkbox"/> Lengua Castellana y Literatura
<input type="checkbox"/> Matemáticas
<input type="checkbox"/> Otra. Indica cuál: : <input type="text"/>

¿Has obtenido algún NOTABLE (7 u 8) en el curso pasado?

<input type="checkbox"/> Sí
<input type="checkbox"/> No

¿En qué asignatura/s obtuviste notable? Puedes marcar más de una.

<input type="checkbox"/> Inglés
<input type="checkbox"/> Lengua Castellana y Literatura
<input type="checkbox"/> Matemáticas
<input type="checkbox"/> Otra. Indica cuál: : <input type="text"/>

Cognitive Reflection Test (CRT)

The CRT refers to the Cognitive Reflection Test developed by Frederick (2005) and later adapted for non-adult populations by Thomson and Oppenheimer (2016). The test consists of three questions designed to elicit both intuitive and reflective responses. Each item offers an intuitive but incorrect answer, and a correct one that requires analytical reasoning. Based on this task, we compute the number of reflective responses, with higher scores indicating greater cognitive reflection (see Brañas-Garza et al., 2019b, for a review).

Por favor, responde las preguntas siguientes. En estas preguntas sí hay respuestas correctas e incorrectas.

En una biblioteca, todos los meses se duplica el número de libros. Si la biblioteca tarda 48 meses en llenarse, ¿cuánto tardaría en llenarse a la mitad? Indica con un número.

Introducir valor

Introduzca el valor de la respuesta.

Si estás corriendo una carrera y pasas a la persona que está en segunda posición, ¿en qué posición estás? Indica con un número. Por ejemplo: 1 (primero), 2 (segundo), etc

Introducir valor

Introduzca el valor de la respuesta.

El padre de Emilia tiene 3 hijas. Las dos primeras se llaman Abril y Mayo. ¿Cuál es el nombre de la tercera hija?

Introducir texto

2000 caracteres restantes.

Patience and risk elicitation

Time Preferences (Patience). Patience is measured using a task developed by Alfonso et al. (2023), in which students make a series of six sequential choices between receiving a smaller amount of money today or a larger amount in the future. This variable is also standardized using the min-max method, such that values closer to 1 represent higher levels of patience. Below, we present screenshots of the task interface.

Time discount

Time discounting

A lo largo de las siguientes 6 pantallas, tendrás que tomar 6 decisiones (una por pantalla) sobre **cómo quieres recibir una cantidad de dinero** hipotética.

Tu tarea es **elegir qué opción prefieres**, sabiendo que, si eliges una recibirás el dinero **mañana**, y si eliges la otra lo recibirás **la semana que viene**.

Conforme vayas avanzando en las decisiones, la cantidad de dinero que recibirás por esperar será cada vez mayor.

Decision #1

¿Qué prefieres?

A) B)

Entrega en: 1 día

Entrega en: 8 días

10€

10€

Detailed description: This decision screen shows two options, A and B. Option A features a gift icon with a blue ribbon labeled '10€' and a red box indicating 'Entrega en: 1 día'. Option B features a similar gift icon with a blue ribbon labeled '10€' and a red box indicating 'Entrega en: 8 días'. Both options include a small truck icon representing delivery.

Decision #2

¿Qué prefieres?

A) B)

Entrega en: 1 día

Entrega en: 8 días

10€

12€

Detailed description: This decision screen shows two options, A and B. Option A features a gift icon with a blue ribbon labeled '10€' and a red box indicating 'Entrega en: 1 día'. Option B features a gift icon with a blue ribbon labeled '12€' and a red box indicating 'Entrega en: 8 días'. Both options include a small truck icon representing delivery.

Decision #3

¿Qué prefieres?

A) B)

Entrega en: 1 día

Entrega en: 8 días

10€

14€

Detailed description: This decision screen shows two options, A and B. Option A features a gift icon with a blue ribbon labeled '10€' and a red box indicating 'Entrega en: 1 día'. Option B features a gift icon with a blue ribbon labeled '14€' and a red box indicating 'Entrega en: 8 días'. Both options include a small truck icon representing delivery.

Decision #4

¿Qué prefieres?

<input type="radio"/> A)	<input type="radio"/> B)
	

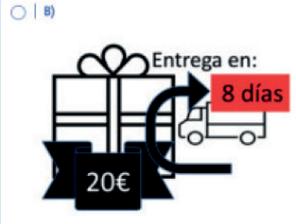
Decision #5

¿Qué prefieres?

<input type="radio"/> A)	<input type="radio"/> B)
	

Decision #6

¿Qué prefieres?

<input type="radio"/> A)	<input type="radio"/> B)
	

Risk preferences. Risk attitudes are measured using a task developed by Vasco and Vázquez (2025), in which adolescents make six sequential decisions. In each decision, they choose between two options (A and B), each represented by a gumball machine with different payouts and probabilities. Option A is the safer choice, while Option B is riskier, offering a wider range of possible outcomes. A student's risk preference is measured as the number of times they choose Option B (ranging from 0 to 6). As with previous variables, the measure is standardized using the min-max method, so that values closer to 1 indicate a greater willingness to take risks. Screenshots of the task interface are shown below.

Risk elicitation

Risk task

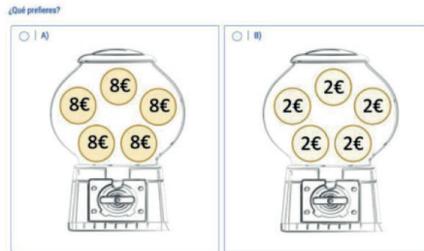
En esta tarea vas a tomar decisiones sobre **probabilidades**. Probabilidad es la posibilidad de que algo pase, es decir, cómo alguien está seguro de qué va a ocurrir.

En cada decisión **tendrás que elegir entre dos opciones** donde podrás ganar dinero ficticio: en ambas vas a ganar, pero puedes tener más suerte y ganar más, o puedes tener menos suerte y ganar menos. **Las probabilidades de ganar van cambiando de una decisión a otra.**

A continuación, se te presentan **6 preguntas diferentes**. Tu tarea consiste en elegir la opción **A**) o la opción **B**) en **todas** las preguntas.

Para realizar la tarea, pasa a la **siguiente pantalla**.

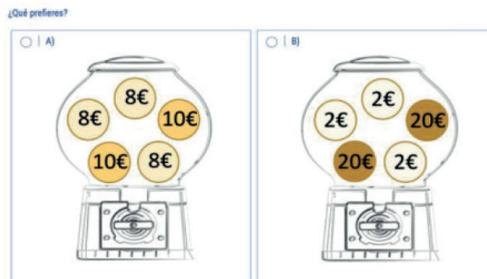
Decision #1



Decision #2

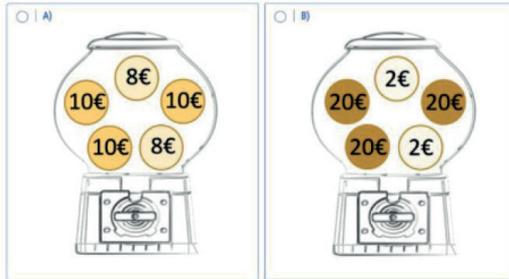


Decision #3



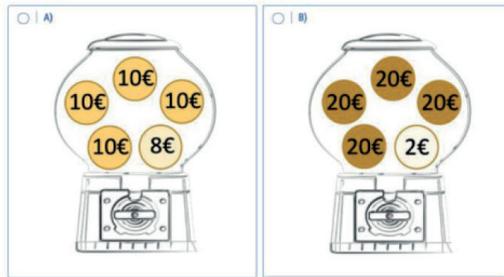
Decision #4

¿Qué prefieres?



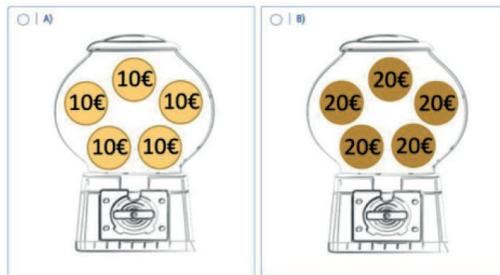
Decision #5

¿Qué prefieres?



Decision #6

¿Qué prefieres?



Appendix C: Estimations results

TABLE A1. Estimation of the short-term effect of grade repetition: ATT estimates using kernel PSM.

	(1)	(2)	(3)	(4)
	Friends	Best friends	Enemies	Worst enemies
<i>a) In-degree</i>				
ATT	-1.290**	-1.238***	1.515***	0.631*
	(0.540)	(0.287)	(0.572)	(0.339)
Observations	1,821	1,821	1,821	1,821
<i>b) Out-degree</i>				
ATT	-0.785	-1.244***	0.801	0.223
	(1.036)	(0.392)	(0.664)	(0.177)
Observations	1,821	1,821	1,821	1,821
<i>c) Betweenness</i>				
ATT	1.055	-5.266	5.957*	0.776**
	(3.463)	(3.230)	(3.325)	(0.378)
Observations	1,821	1,821	1,821	1,821
<i>d) Clustering</i>				
ATT	-0.0584	-0.238***	0.131**	0.0620*
	(0.0366)	(0.0650)	(0.0586)	(0.0371)
Observations	1,821	1,821	1,821	1,821
Note: Standard errors in parentheses. Asterisks indicate statistical significance: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.				

TABLE A2. Estimation of the long-term effect of grade repetition on in-degree, based on multiple regression analysis.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Friends	Friends	Best friends	Best friends	Enemies	Enemies	Worst enemies	Worst enemies
Repeater	-0.486	-1.058**	-0.387*	-0.622**	0.235	1.010*	0.158	0.362
	(0.495)	(0.511)	(0.234)	(0.252)	(0.565)	(0.528)	(0.316)	(0.319)
Female		-0.281		-0.251		0.672		0.138
		(0.465)		(0.212)		(0.414)		(0.232)
CRT		0.520		-0.357		-2.390***		-1.237***
		(0.892)		(0.403)		(0.767)		(0.447)
GPA		-0.636		-0.261		0.550		-0.340
		(0.738)		(0.351)		(0.654)		(0.375)
Patience		-0.915		-0.722**		1.428**		0.720*
		(0.745)		(0.303)		(0.698)		(0.422)
Risk		0.508		0.163		-0.859		-0.662
		(1.463)		(0.693)		(1.075)		(0.567)
Age		0.035		0.110		-0.541**		-0.341**
		(0.206)		(0.101)		(0.230)		(0.140)
Multiple repetition		0.816		0.210		0.614		0.430
		(0.669)		(0.289)		(0.780)		(0.517)
Constant	7.629***	7.665**	2.396***	1.319	2.322***	10.257***	0.947**	6.571***
	(0.740)	(3.419)	(0.363)	(1.674)	(0.593)	(3.840)	(0.460)	(2.264)
Observations	203	190	203	190	203	190	203	190
	0.161	0.222	0.135	0.199	0.118	0.222	0.047	0.124
School Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes	No	Yes	No	Yes

Note: Standard errors in parentheses. Asterisks indicate statistical significance: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

TABLE A3. Estimation of the long-term effect of grade repetition on out-degree, based on multiple regression analysis.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Friends	Friends	Best friends	Best friends	Enemies	Enemies	Worst enemies	Worst enemies
Repeater	-0.200	0.197	-0.352	-0.151	-0.394	-0.529	-0.080	-0.003
	(0.946)	(0.936)	(0.395)	(0.343)	(0.484)	(0.540)	(0.202)	(0.192)
Female		-1.761**		-0.123		1.124**		0.094
		(0.822)		(0.305)		(0.544)		(0.247)
CRT		-1.279		0.091		2.023*		0.423
		(1.656)		(0.533)		(1.164)		(0.488)
GPA		1.916		-0.375		1.466		0.763
		(1.260)		(0.471)		(0.974)		(0.538)
Patience		0.168		-0.151		-0.267		0.199
		(1.101)		(0.424)		(0.689)		(0.307)
Risk		-2.033		-0.746		-1.596		0.542
		(2.394)		(0.828)		(1.267)		(0.515)
Age		0.453		0.206		-0.372		-0.036
		(0.428)		(0.152)		(0.247)		(0.138)
Multiple repetition		0.484		-0.086		1.721**		0.228
		(1.477)		(0.410)		(0.683)		(0.224)
Constant	6.267***	0.718	2.584***	-0.026	2.731*	7.977*	0.827***	0.514
	(1.554)	(6.722)	(0.606)	(2.482)	(1.470)	(4.573)	(0.234)	(2.089)
Observations	203	190	203	190	203	190	203	190
	0.081	0.111	0.073	0.049	0.057	0.139	0.028	0.035
School Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes	No	Yes	No	Yes

Note: Standard errors in parentheses. Asterisks indicate statistical significance: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

TABLE A4. Estimation of the long-term effect of grade repetition on betweenness, based on multiple regression analysis.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Friends	Friends	Best friends	Best friends	Enemies	Enemies	Worst enemies	Worst enemies
Repeater	1.678	1.191	-1.410	-1.157	-1.312	0.218	0.093	0.385
	(2.922)	(2.922)	(2.313)	(2.513)	(3.053)	(3.400)	(0.390)	(0.397)
Female		-4.719*		2.810		7.355**		0.916**
		(2.519)		(2.433)		(3.034)		(0.353)
CRT		-2.674		-8.275		0.267		-0.887
		(4.412)		(5.199)		(5.407)		(0.660)
GPA		4.414		-5.443**		5.298		0.160
		(4.111)		(2.557)		(5.560)		(0.666)
Patience		4.448		-4.771		1.187		0.425
		(3.784)		(3.083)		(4.408)		(0.575)
Risk		-9.688		2.880		-4.962		-0.205
		(6.202)		(8.841)		(9.744)		(1.215)
Age		2.259*		1.325		-0.995		-0.054
		(1.315)		(1.207)		(1.496)		(0.172)
Multiple repetition		2.792		-0.438		1.640		0.068
		(4.328)		(2.772)		(3.794)		(0.481)
Constant	7.656**	-22.829	9.108**	-9.000	15.167**	26.217	1.702**	1.938
	(3.782)	(19.600)	(4.023)	(16.659)	(6.329)	(27.330)	(0.849)	(3.217)
Observations	203	190	203	190	203	190	203	190
	0.022	0.052	0.038	0.063	0.042	0.054	0.065	0.089
School Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes	No	Yes	No	Yes
Note: Standard errors in parentheses. Asterisks indicate statistical significance: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.								

TABLE A5. Estimation of the long-term effect of grade repetition on clustering, based on multiple regression analysis.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Friends	Friends	Best friends	Best friends	Enemies	Enemies	Worst enemies	Worst enemies
Repeater	0.018	-0.024	-0.099	-0.119*	0.069	0.067	0.039	0.038
	(0.035)	(0.036)	(0.062)	(0.065)	(0.052)	(0.056)	(0.041)	(0.047)
Female		0.023		0.012		-0.005		-0.023
		(0.031)		(0.057)		(0.045)		(0.034)
CRT		0.112*		0.002		-0.121		-0.042
		(0.067)		(0.110)		(0.074)		(0.051)
GPA		-0.112**		-0.156*		0.036		0.069
		(0.047)		(0.091)		(0.064)		(0.063)
Patience		-0.097*		0.050		-0.047		-0.021
		(0.051)		(0.093)		(0.067)		(0.038)
Risk		0.134		0.173		-0.198		-0.108
		(0.121)		(0.170)		(0.128)		(0.102)
Age		-0.027**		-0.023		0.004		-0.002
		(0.014)		(0.028)		(0.020)		(0.016)
Multiple repetition		0.065		-0.052		-0.003		0.048
		(0.046)		(0.095)		(0.066)		(0.058)
Constant	0.753***	1.168***	0.687***	0.982**	0.154**	0.254	0.014	0.114
	(0.039)	(0.239)	(0.107)	(0.455)	(0.069)	(0.325)	(0.028)	(0.255)
Observations	203	190	203	190	203	190	203	190
	0.167	0.213	0.069	0.090	-0.009	-0.034	-0.013	-0.036
School Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes	No	Yes	No	Yes
Note: Standard errors in parentheses. Asterisks indicate statistical significance: *** p < 0.01, ** p < 0.05, * p < 0.10.								

Contextual and non-cognitive variables and peer effect as factors associated with grade repetition in Spain

VARIABLES CONTEXTUALES, NO COGNITIVAS Y EL EFECTO PARES COMO FACTORES ASOCIADOS A LA REPETICIÓN DE CURSO EN ESPAÑA

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Abstract

Although it has slightly decreased in recent years, Spain remains one of the countries with the highest repetition rates. This study aimed to analyze the relationship between grade retention and both contextual and non-cognitive student factors in the Spanish PISA 2022 sample, with particular attention to the peer effect exerted by classmates on repetition. Using a sample of over 30,000 students and almost 1,000 schools, predictive variables were included both individually and aggregated at the school level to examine peer effects. Following a

selection of variables associated with grade repetition based on their correlations, multilevel logistic regression models with fixed slopes and random intercepts were applied. The results contribute to previous studies by highlighting a significant impact of the student's school environment on grade repetition. 15% of the variability associated with grade repetition can be explained by the grouping of students in schools. At the individual level, the contextual variables most strongly associated with repetition are family socioeconomic status and migration background. Among non-cognitive variables at the student level, the results indicate the significant protective effect of academic expectations, punctuality, perseverance, regular school attendance, and family support, as well as the risks associated with bullying, having numerous household responsibilities, or excessive use of ICT for leisure during the week. Additionally, the association between variables aggregated at the school level and individual repetition stands out. A higher percentage of female students in the school, high overall academic expectations, good overall levels of assertiveness among students, and appropriate use of ICT were found to exert a protective peer effect against grade repetition. Moreover, widespread poor eating habits or excessive domestic responsibilities emerge as risk factors displaying peer effects. The impact of these peer effects on grade retention raises questions about the strategies implemented within the educational system to promote academic success.

Key words: Grade retention, non-cognitive factors, contextual factors, multilevel logistic regression, compulsory secondary education.

Resumen

Aunque ha disminuido ligeramente en los últimos años, España sigue siendo uno de los países con una mayor tasa de repetición. El objetivo de este estudio fue analizar la relación entre la repetición de curso y tanto factores contextuales como no cognitivos del estudiante en la muestra española de PISA 2022, incluyendo el análisis del efecto pares que ejercen los compañeros sobre la repetición. Con una muestra superior a 30000 estudiantes y casi 1000 escuelas, se incluyeron variables predictoras tanto individualmente como agregadas al nivel escuela para estudiar el efecto pares. Tras una selección de variables asociadas a la repetición a partir de sus correlaciones, se aplicaron modelos logísticos multinivel de pendientes fijas e interceptos aleatorios. Los resultados aportan a los estudios previos que existe un impacto significativo del entorno escolar del estudiante sobre la repetición de curso. El 15% de la variabilidad asociada a la repetición de curso puede explicarse por la agrupación de los estudiantes en escuelas. A nivel individual, las variables contextuales de mayor asociación con la repetición son el nivel socioeconómico familiar y el estatus migratorio. Como variables no cognitivas, los resultados indican el importante efecto protector de las expectativas académicas junto con la puntualidad, la perseverancia, acudir siempre a clase o el apoyo familiar, así como el riesgo asociado a recibir *bullying*, tener muchas obligaciones domésticas o un uso excesivo de las TIC para el ocio durante la semana. Por otro lado, destaca la asociación de variables agregadas al nivel escuela con la repetición individual. Un mayor porcentaje de estudiantes de género femenino en la escuela, niveles generales elevados de expectativas académicas, buenos niveles de asertividad en los estudiantes, y un manejo apropiado de las TIC ejercen un efecto pares protector de la repetición. Por su parte, los malos hábitos alimenticios generalizados o excesivas obligaciones en las labores del hogar destacan

como factores de riesgo que muestran efecto pares. El impacto que alcanza este efecto pares sobre la repetición hace replantearse las estrategias aplicadas en el sistema educativo para promover el **éxito** escolar.

Palabras clave: Repetición de curso, factores no cognitivos, factores contextuales, regresión logística multinivel, educación secundaria obligatoria.

Introduction

Grade repetition is a complex phenomenon that can be analysed from different perspectives and distinct levels (Bronfenbrenner, 1979). The first level of analysis (*exo-macro*) refers to factors at higher levels that the school students attend and that surround and envelope their reality. Issues such as state organisation, geography, demography, cultures or education policies can be found in this level of analysis, which enables us to study differences between countries and regions, and research associated factors. An intermediate (*meso*) level features factors associated with schools and/or classrooms, including the characteristics of the school, teacher beliefs, teacher-student relationship, etc. Finally, at individual (*micro*) level, we find contextual, cognitive and non-cognitive student characteristics (Fonteyne et al., 2017).

Thus, based on the CIPO model (Scheerens, 1990), the output (in this case, grade repetition) causes contextual factors (demographic, biological, cultural and socioeconomic inputs of students and their surroundings), non-cognitive factors such as attitudes, beliefs, personality, social and emotional qualities or learning processes (Fonteyne et al., 2017) and cognitive factors¹ (mental and intellectual processes).

Considering that recent papers delve into grade repetition at *exo-macro* levels in the context of Spain (Nieto-Isidro & Martínez-Abad, 2023), this study proposes advancing in knowledge of factors associated with grade repetition at school and student levels (*meso* and *micro*) based on the CIPO model. Another fundamental contribution of this research is to study the “peer effect” on grade repetition. This effect refers to the influence that group characteristics exercise on individual outputs. While there is a wealth of literature on the peer effects on academic performance (Paloyo, 2020), no proposals include

¹ As PISA 2022 does not include information on student cognitive factors, this study focuses on contextual and non-cognitive factors.

grade repetition in the prediction. This effect will be studied by aggregating individuals scores in student context and non-cognitive factors at school level (Gamazo et al., 2018).

Data from the Organization of Economic Cooperation and Development (OECD) PISA 2022 assessment will be used for this study. Applying multi-level logistic regression models will be proposed for a multivariate analysis of the phenomenon of grade repetition, taking into account the existing interrelationship between meso- and micro-level factors.

Cultural, socioeconomic and political components of repetition

Grade repetition can be studied from a *macro* level, i.e., from a perspective of countries or regions, considering two aspects: the existence of political, cultural and social components that favour the maintenance of grade repetition and justify its presence in education systems; and the educational, economic and social consequences of repetition at country or region level.

In view of international assessments, it is clear that the percentage of students repeating grade varies greatly from country to country. In the specific case of the European Union, grade repetition policies vary greatly by country, from those that do not contemplate this option in legislation with automatic promotion during compulsory schooling, to countries with a high rate of repetition such as Spain (García-Merino et al, 2024). The 34-country study by Goos et al (2013), using data from PISA 2009, TALIS 2007 and education policy reports drafted by the OECD, also shows that up to 25% of grade repetition variability is at country/region level. Goos et al (2021) state that there is a cultural, social component that contemplates repetition as one of the valid tools in education systems to ensure students acquire the necessary knowledge and skills. On the other hand, repetition has consequences on educational, economic and social structures in countries and regions: repetition has been linked with academic failure, dropping out and less choice of university studies, as highlighted in various studies focusing on Spain (Calero et al, 2010; Calero et al, 2012; Choi, 2018; López-Rupérez et al, 2021; Suberviola, 2025) and other countries, for example Contini and Salza (2024) in Italy, Hughes et al (2028) and Jacob and Lefgren (2009) in the United States or Van Canegen et al (2023) in Belgium. Also, from a macro-level education policy-maker perspective, grade repetition is a highly ineffective

measure from an economic point of view as it increases the cost of education and increases inequality (Calero et al,2012; López-Agudo et al 2014; López-Rupérez, 2021; OECD, 2011).

In the specific case of Spain, the study of factors related with repetition from a *macro* perspective at regional level has been addressed by the authors in a previous study (Nieto-Isidro & Martínez-Abad, 2023) in which the rate of repeaters in schools given by PISA 2018 is related with variables at Autonomous Region level linked to socioeconomic factors, indicators of wealth and spending on education, quality of life indicators and indicators of economic inequity or inequality, showing that there are significant differences between the various Autonomous Regions. This *macro* level will therefore not be the subject of this study; we will mainly concentrate on *meso* (school) and *micro* (student) levels.

Repetition and schools

Secondly, a *meso* level can be defined related to schools, analysing their contextual, socioeconomic and educational characteristics that may be relevant to repetition. In the context of Spanish education, school characteristics have been included in various research projects, but they have generally focused on variables such as performance, academic failure, educational equity, school effectiveness, etc., and not directly on repetition, the subject of this study. Moreover, the outcomes of the papers that could be cited are not conclusive: for example, Nieto-Isidro and Martínez-Abad (2023), using data from the Spanish PISA 2018 sample, show that various school characteristics such as socioeconomic level, ownership, town and school size, or percentage of men and immigrants, are related with their repeating student rate. However, in the study by Cordero et al. (2014), with PISA 2009 data, school-level variables have no significant effect on grade repetition, except for the concentration of immigrant students in the classroom when they exceed 30%. According to Pedraja et al. (2016), with PISA 2003 and 2009 data, the proportion of immigrant students by school affects the immigrant students themselves—leading to a higher rate of repetition—but not the native students if the concentration of immigrants is below 15%. Considering academic failure instead of repetition, the paper by Calero (2010) shows a significant relationship between academic failure and the proportion of immigrant students in the school when this concentration exceeds 20% of the student body; while the proportion of girls and educational level of parents act as protective factors.

How school characteristics affect repetition is also underlined in some studies in other countries: the most consistent outcome is the relationship between average school socioeconomic level, as in the study by Ferrão et al (2017) with PISA 2012 data in Brazil. The international review study by López et al. (2023) also identifies a low socioeconomic level and high percentage of immigrants as the most important school factors linked with repetition in public schools.

Repetition and student characteristics

Finally, at *micro* level, it is important to determine which personal, family or contextual characteristics are related with grade repetition. As for contextual characteristics of repeating students, research in Spain shows mainly that gender (boy), birth month (born at the end of the year), immigrant status and, above all, family socioeconomic level (lower socioeconomic status) are risk factors related with repetition, as indicated in studies by Choi et al. (2018) or Cordero et al. (2014), who add not enrolling in early childhood education. In the recent study by Álvarez-García et al. (2024) with data from the Spanish PISA 2022 sample, the group of students with a higher rate of repetition is largely formed by first- and second-generation immigrants who also have a low socioeconomic level and weaker family and social support networks.

These outcomes obtained with data from Spain are corroborated by different studies on repetition in other countries: for example, in a longitudinal study by Contini and Salza (2024) in Italy, repeating students are mostly male, immigrants and with parents with a low level of studies. Likewise, the longitudinal study by Klapproth and Schaltz (2015) with students from Luxembourg, adds following a lower academic path to the factors of gender, nationality and socioeconomic status. Goos et al. (2013) with PISA 2009 data in the 24 OECD countries, also find a direct relationship between grade repetition and gender (male), being an immigrant, low level of parent studies and language spoken at home. However, in the study by Ikeda and García (2014) with the same PISA 2009 data, the relationship between repetition and socioeconomic status is heterogeneous in the 30 countries analysed; the same occurs with the relationship between repetition and gender, immigration status or age. López et al. (2023) find a series of student-level variables linked with repetition; some are contextual, such as gender or being an immigrant, and others non-cognitive, like motivation problems and frequently playing video

games. An inverse relationship between using computers for homework is also observed and a direct relationship with not having their own computer and having lower educational expectations to continue studying.

Among the non-cognitive factors, there is solid evidence that links repeating with educational and/or job expectations. In the case of Spain and with PISA 2015 data, Choi (2018) has demonstrated not only the role that academic expectations play on academic performance, but the relationship between these aspirations with family socioeconomic factors and with peer expectations, as well as the inverse relationship between grade repetition and expectations to complete higher studies and the direct relationship with expectations of abandoning the education system early. Also with PISA 2015 data in Spain, the study by Arroyo et al. (2019) indicates that students with lower educational aspirations are more likely to repeat. An analysis by Constante-Amores et al. (2022), with PISA 2018 data from Spain, points out that expected student status is a significant predictor of grade repetition both in primary and compulsory secondary education. In the study mentioned by Álvarez-García et al. (2024) with the Spanish PISA 2022 sample, the group of students with a higher rate of repeaters also has lower future aspirations.

Is repeating beneficial for students?

Scientific research on the possible benefits or detriments of repeating is far from conclusive and depends greatly on the methodological quality of the studies (Allen et al., 2009).

By analysing the effect of repeating on performance, one of the difficulties found is the difference between comparing repeating students with their classmates (younger) or comparing them with their peers (a grade higher). Thus, Bonvin et al. (2008) found a positive effect in short- and medium-term performance in primary education students in Switzerland when comparing students of the same level, but the effect is negative when comparing students of the same age. In a longitudinal study, Wu et al. (2008) also found interesting effects: repeating students, when compared with their peers of the same age, show lower short-term performance in mathematics and reading, but this performance is higher in the long term, while if compared with students in the same grade, increased performance is higher in the short term but reduces in the long term.

Some longitudinal studies show certain positive effects of repeating, with a slight increase in academic performance that generally drops over time

(Allen et al., 2009; Klapproth et al., 2016; Marsh, 2016). Many voices both in Spain (Calero et al., 2010; Calero et al., 2012; Choi et al., 2018; León & Martínez-Abad, 2025; López-Agudo et al., 2024; Rodríguez, 2022; Rodríguez & Batista, 2021) and in other countries (Allen et al., 2009; Bonvin et al., 2008; Contini & Salva, 2024; Ehmke et al., 2010; Lamote et al., 2014, OECD, 2011) point to repeating a grade as an ineffective method for improving medium- and long-term student performance (Goos et al., 2021; Valbuena et al., 2021).

Studies on the relationship between repeating and non-cognitive variables also show a negative effect. In Spain, the study by Rodríguez and Batista (2021) with compulsory secondary education students in the Canary Islands, found a lower academic self-concept in repeating students compared to those who did not repeat; the study by León and Martínez-Abad (2025), with data from the Spanish PISA 2022 sample, shows a negative causal effect of repetition on student mathematical self-efficiency.

These same results are reproduced in other countries. Martin (2011) uses Australian students to show the relationship between grade repetition and lower academic motivation, engagement and self-concept, as well as the negative effects in relations with classmates and self-esteem; Peixoto et al. (2016) also found a drop in academic self-concept and self-esteem among repeating Portuguese students compared to their non-repeating peers. The study by Klapproth et al. (2016) with secondary students in Luxembourg found a slight decrease in the self-esteem of repeating students compared to their non-repeating classmates. In the longitudinal study by Kretschmann, et al. (2019) with German compulsory secondary education students found no improvement in student academic self-concept after repeating.

Other studies report beneficial outcomes of repeating at short-term, non-cognitive level: Ehmke et al. (2010) with secondary students in Germany found positive effects one year later in the mathematical self-concept of repeating students; Bonin et al. (2008) found a rise in academic self-concept, social acceptance and attitudes towards school in repeating students in Switzerland when compared to low-performance students passing grade, although this effect diminishes over the academic year. Meanwhile, when studying mathematical self-concept with PISA 2003 data in 41 countries, Marsh (2016) found a positive effect in the case of repeating grade and negative for moving up a grade. In the paper by Pipa et al. (2023) with Portuguese students, repeating students show no difference in self-esteem or short-, medium- and long-term aspirations; they do, however, show a short-term increase in academic

self-concept that drops over time. This short-term rise in self-concept is also an outcome of the study by Lamote et al. (2014) with secondary students in Belgium.

Study objectives

Although studies on factors associated with repeating in Spain are numerous, they fundamentally focus on detecting contextual factors at school and student levels. However, while literature on the effect of non-cognitive student factors is more limited, few studies are available that pay attention to the role peers play in grade repetition. So the primary objective of this study is to analyse the relationship between the main contextual and non-cognitive personal factors and grade repetition, differentiating between the effect of these factors on repetition at individual student level and the peer effect exerted by the characteristics of their classmates.

The specific study objectives are:

1. Analyse individual contextual and non-cognitive factors related with grade repetition.
2. Study the effect that the characteristics of the student's classmates has on the likelihood of them repeating grade (peer effect).

Method

Secondary quantitative analyses were applied using PISA 2022 databases following a positivist research approach. PISA is the most important large-scale assessment worldwide in terms of number of participating countries. It allows us to monitor and compare the quality, equity and efficiency levels of national education systems (OECD, 2022), establishing a competency-based approach when measuring academic performance (OECD, 2023). Given that PISA tests offer panel data of participating countries every three years, a non-experimental, cross-sectional **design** was used to analyse panel data.

Population and sample

Based on the population of 15-16-year-old students at Spanish schools offering compulsory secondary education, a sample of $n=30,800$ students and $m=966$ schools was included.

PISA 2022 ensures population representativeness by applying stratified probability sampling (by ownership and subregion) by clusters (schools) in two stages with probabilities proportional to size. In fact, the Spanish sample was the largest of all countries assessed in PISA 2022 as it included representative samples for each autonomous region and city. Table I shows sample distribution by some characterisation variables.

TABLE I. Sample characterisation

Variable	Distribution
Grade repetition (REPEAT)	Never repeated: 78.3% Repeated at least once: 21.7%
Gender (GENDER)	Woman: 49.5% Man: 50.5%
Immigration status (IMMIG)	Native: 84.9% Second-generation immigrant: 8.8% First-generation immigrant: 6.3%
Skipping class (SKIPPING)	No class skipped (last two weeks): 58.1% At least one class skipped (last two weeks): 41.9%
Late for class (TARDYSD)	Always on time (last two weeks): 59.7% Occasionally late (1-2 times in last two weeks): 26.1% Frequently (3 or more times in last two weeks): 14.2%
Academic expectations (EXPECEDU)	Compulsory secondary education: 4.2% Intermediate VT: 3.6% Baccalaureate: 13.0% Advanced VT: 13.0% Undergraduate degree: 18.0% Master's degree: 28.1% Doctoral thesis: 20.0%

Job prospects (SISCO)	No clear idea about future work: 15.2% Clear idea about future work: 84.8%
School ownership (SCHL-TYPE)	Public school: 58.1% State-subsidised private school: 31.5% Private school: 10.4%

Source: Prepared by authors

Variables and instruments

Given the secondary nature of this study, instrumentation for obtaining outcomes is defined and implemented by the OECD. While some variables included are simple indicators obtained directly from the context questionnaires applied, others are compound factors obtained from blocks of items applied to students and management teams. The full instrumentation and items including compound factors are explained in detail in the OECD *Assessment and Analytical Framework (2023)* and *Technical Report (2022)*. The complete list of variables used, selected from prior literature (Gamazo et al., 2018; Nieto-Isidro & Martínez-Abad, 2023), is available in [Online Appendix I](#).

More specifically, in this study we can differentiate between criterion and predictor variables:

- Student's grade repetition status was used as a criterion variable (*REPEAT* in PISA). This variable is dichotomous, with values 0 (non-repeater) and 1 (has repeated at least one grade).
- Relevant contextual variables (gender, immigration status, socio-economic level, school ownership, student-teacher ratio, school resources available, etc.) and non-cognitive variables (academic and job expectations, class attendance, school climate, socio-emotional skills, use of ICTs, personal well-being, etc.) were included as predictor variables to respond to the objectives proposed.

Procedure and data analysis

The analytical approach of this study was correlational. Given the high initial number of variables, a bivariate correlational analysis between grade repetition and the set of explanatory variables at student and school level was first conducted. Thus, the subsequent multiple regression model only included

variables relevant to the study.

Three aspects of the databases had to be pre-processed before applying statistical techniques:

1. Standardisation of all scale variables available to a $Z(0,1)$ distribution. This unifies interpretation of the parameters of logistic regression models obtained, simplifying their understanding.
2. Transformation of available polytomous variables into dichotomous (dummy) variables:
 - Immigration status:
 - IMMIG (natives): 0=1st and 2nd generation immigrant; 1=Native.
 - IMMIG (immigrants): 0=Native and 1st generation Immigrant; 1=Native.
 - Late for class:
 - TARDYSD (never): 0=Sometimes and frequently late; 1=Always punctual.
 - TARDYSD (frequent): 0=Always punctual or sometimes late; 1= Frequently late.
 - School ownership:
 - SCHLTYPE (public): 0=State subsidised and private; 1=Public.
 - SCHLTYPE (private): 0=State subsidised and public; 1=Private.
3. Give the known *peer effect* that peers exert on student academic performance (Gamazo et al., 2018) and the relevance of school-level factors on grade repetition (Nieto-Isidro & Martínez-Abad, 2023), aggregate average values at school level of all student-level variables included in the study were added to the final database.

With the final database, the percentage of repeating students in Spain was analysed by autonomous region in PISA 2022 compared to PISA 2018 to obtain an initial descriptive approximation to the problem of repeating grade in Spain.

Correlations between grade repetition and the set of predictor variables at both student and school level were then obtained; only predictor variables with significant correlations and non-trivial relationship effect sizes —

² Despite its ordinal nature, as 7 clearly staggered levels are included, the Academic expectations (EX-PECEDU) variable is considered to be a scale variable in analyses.

over .1— were selected for the subsequent multi-level logistic model. The point-biserial correlation was obtained in the case of scalar predictor variables and the phi correlation for dichotomous predictor variables.

Finally, binary logistic multi-level regression models (*logit*) were applied considering student (L1) and school (L2) levels. The backward stepwise regression technique was applied to obtain fully significant models, eliminating the non-predictor variable with the lowest weight (smallest t value) on the criterion variable in each iteration.

Specifically, two models were obtained:

1. Contextual model: formed exclusively by significant contextual predictor variables. Included as a baseline to initially control contextual effects associated with grade repetition.
2. Complete model: including contextual variables from the previous model and other non-cognitive variables identified in the prior correlational analysis.

Based on proposals from previous studies that apply multi-level models from PISA data (Gamazo et al., 2018) and considering the high number of predictor variables in the model, multi-level models with fixed slopes and random intercepts were obtained. This decision simplifies model calculation and interpretation, however its main limitation is that it assumes that the effective of predictor variables is constant across schools. The Intraclass Correlation Index (ICI) is also obtained from the null multi-level regression model to assess the suitability of multi-level model calculation. ICI reports on the percentage of total variance of the criterion variable explained by how subjects are grouped in schools. Taking into account recommendations from reference works (Lee, 2000), a minimum ICI of 10% is set to consider multi-level model application as suitable.

For easier interpretation of the logistic regression model, odds ratios (OR) were transformed to report on the proportion increase of likelihood of repeating by increasing the predictor variable by one POR unit. In the case of ORs under 1 (predictor variable with inverse effects), proportion values were reported as negative. They were transformed as follows:

- If $OR > 1 \rightarrow POR = OR - 1$
- If $OR < 1 \rightarrow POR = -[(1/OR) - 1]$
- If $OR = 0 \rightarrow POR = 0$

Model fit quality was assessed using information from the confusion matrix, which reports observed and predicted values. The overall accuracy percentage of the model was reported using this table, understood as the relationship between total accurate predictions (true positives and negatives) and total cases.

Since PISA includes a complex sample design (OECD, 2022), available sample weights had to be taken into account in estimates. School-level weights were included based on recommendations by Jakubowski et al. (2022).

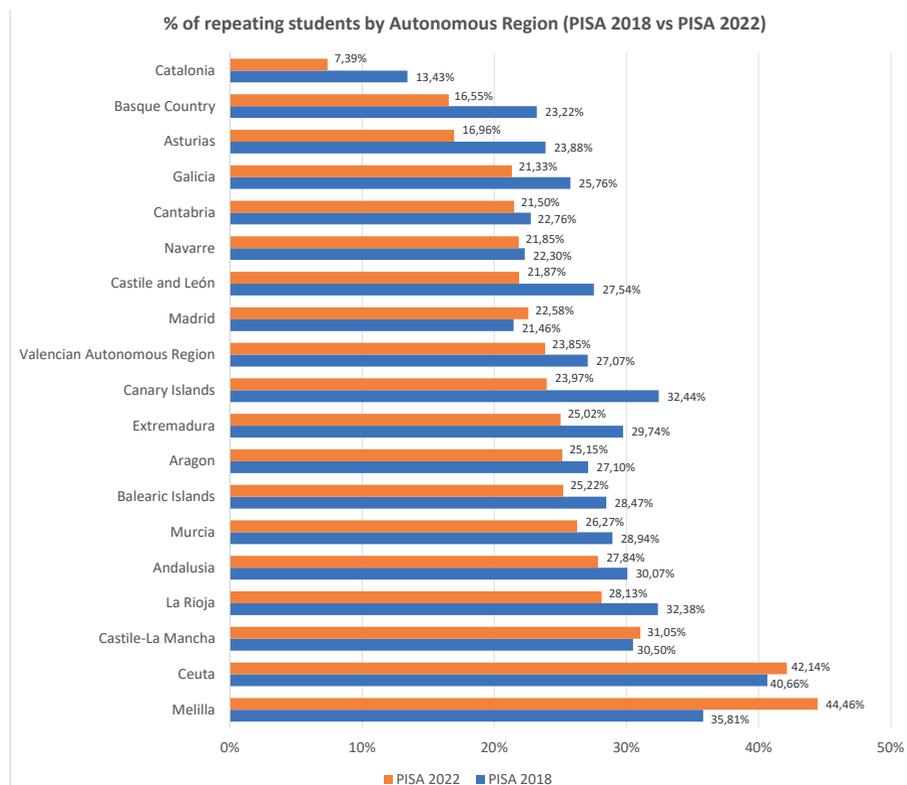
All analyses were run using SPSS software (v.23) and starting with a significance level of 5%.

Results

According to PISA 2022 data, students in the Spanish sample have a grade repetition rate in the 2022 wave of 21.7%. This figure is a slight improvement compared to the PISA 2018 rate, which was 28.7%, but continues to rank Spain fourth in repetition percentage only behind Colombia, Belgium and the Netherlands and far exceeding the OECD average of 9.1%.

Figure 1 shows the percentage of repeating students by Autonomous Region in the last two PISA waves (2018 and 2022). The greatest reductions can generally be observed in Regions that already had the lowest levels in 2018, increasing the gap between regions, especially compared to the autonomous cities of Ceuta and Melilla where the percentage rises considerably.

FIGURE I. Percentage of repeating students by Autonomous Region in Pisa 2018-2022



Source: Prepared by authors based on PISA data

Correlational study results

Table II shows the significant bivariate correlations obtained between grade repetition and the student’s personal contextual factors at both individual (L1) and school level (L2) where at least one is of high intensity: the full table is available in [Online Appendix II](#). More intense correlations in L2 than L1 can generally be observed in Table I. In other words, student contextual factors aggregated to L2 generally have a more important association effect on grade repetition rate in the school than the student’s personal factors on their own likelihood of repeating.

Of all the variables included, only two show moderate or high inten-

sity associations at both student and school levels: immigration status (IMMIG) and socioeconomic level (ESCS). While lower socioeconomic levels are clearly associated with grade repetition, being an immigrant is also linked to repeating.

Notable correlations can be observed at school level in the case of gender and age. While schools with a higher proportion of women have a lower rate of repeating students, a higher proportion of younger students is associated with a higher grade repetition rate.

TABLE II. Bivariate correlation between grade repetition and personal contextual variables

Student contextual variables	Personal level (L1)	School level (L2)
Gender (GENDER)	.079*	.330
Age (AGE)	-.073*	-.126
Immigration status (IMMIG)	.160	.243
Socioeconomic level (ESCS)	-.322	-.542
ICTs available in the school (ICTSCH)	.008*	.113
ICTs available in the home (ICTHOME)	-.069*	-.222
Quality of ICT access (ICTQUAL)	-.038*	-.154
Body mass (STUBMI)	.086*	.396
COVID-19 problems (PROBSELF)	.074*	-.150

* Very low-intensity correlation

Source: Prepared by authors

Table III shows significant bivariate correlations obtained between grade repetition and moderate or high-intensity school level contextual factors³. As for school ownership (SCHLTYPE), repeating is less common in private and state-subsidised private schools than in public schools. The remaining factors associated with a lower repetition rate in schools is: a greater proportion of teachers with a PhD (PROPAT8), higher number of support teachers (PROPSUPP) and better preparation for digital learning (DIGPREP).

3 Full table available in [Online Appendix II](#).

TABLE III. Bivariate correlation between grade repetition and school contextual variables

Student contextual variables	School level (L2)
School ownership (SCHLTYPE)	.171
Teachers with PhD (PROPAT8)	-.107
Support teachers (PROPSUPP)	-.122
Preparation for digital learning (DIGPREP)	-.120

Source: Prepared by authors

Table IV shows bivariate correlations between grade repetition and non-cognitive personal factors in L1 and L2, where at least one of the two levels has moderate or high-intensity associations⁴. Non-cognitive variables have a less intense and clear trend than contextual variables in their association with grade repetition.

So, some factors such as bullying suffered (BULLIED), perseverance (PERSEVAGR) or academic support from family (FAMSUP) exert a significant effect at student level but very low or insignificant at school level. The different variables linked with handling ICTs (ICTFEED, ICTWKEND, ICTWKDY, ICTREG) appear to have more important effects at school level than student level, as do other variables such as assertiveness (ASSERAGR), physical exercise (EXERPRAC), doing homework (STUDYHMW) or job expectations (SISCO). Meanwhile, other variables affect student and school level to a similar degree, such as skipping classes (SKIPPING) or being late (TARDYSD), doing household chores (WORKHOME) or connection with the family (SOCONPA). Academic expectations (EXPECEDU) is the non-cognitive variable with the greatest bivariate association with repeating at both student and school level. The association is very intense at school level, therefore, schools where the academic expectations of students are generally high clearly have a lower repetition rate.

TABLE IV. Bivariate correlation between grade repetition and non-cognitive variables

Non-cognitive variables	Personal level (L1)	School level (L2)
Skipping class (SKIPPING)	.113	.145
Late for class (TARDYSD)	.145	.196
Exercise (EXERPRAC)	.068*	-.199
Homework (STUDYHMW)	-.038*	-.144
Household chores (WORKHOME)	.103	.154
Academic expectations (EXPECEDU)	-.274	-.573
Job prospects (SISCO)	-.027*	.126
Bullying suffered (BULLIED)	.109	-.039*
Perseverance (PERSEVAGR)	-.116	-.068*
Assertiveness (ASSERAGR)	-.078*	-.317
Academic support from family (FAMSUP)	-.112	-.002**
Feedback by ICT (ICTFEED)	-.025*	-.255
ICT use for leisure at weekend (ICTWKEND)	.079*	.092
ICT use for leisure during week (ICTWKDY)	.112	.234
School ICT regulation (ICTREG)	-.027*	-.128
Connection with family (SOCONPA)	-.116	-.175

* Very low-intensity correlation

**Insignificant correlation

Source: Prepared by authors

Multi-level analysis results

Note that initially more than 15% of variability of the repeater variable can be explained by student grouping in schools (ICI=15.21%), so it is appropriate to create a multi-level model including school-level variables.

As for the multi-level models applied (Table V), the initial contextual model, which only includes student contextual variables in L1 and aggregated to L2, mainly maintains variables added to L2, except immigration status (which only affects L1) and socioeconomic level (with significant effects in both levels). There is therefore a clear peer effect in explaining grade repetition, which emerges along with the significant known effects of individual student characteristics, fundamentally contextual.

As expected, personal contextual variables have the highest effect on grade repetition in the complete model, primarily family socioeconomic level (ESCS), which significantly reduces the likelihood of repeating; a single-unit increase in this variable reduces likelihood by 65.3%. Immigrant status (IMMIG) is another high-impact factor; if all other variables remain stable, immigrant students are 67.6% more likely to repeat than other students.

As noted above, a relevant finding is the importance of peer effect in grade repetition as numerous student contextual variables aggregated in L2 have significant effects, such as proportion of male students (GENDER), which potentially increases likelihood of repeating by more than 10% at individual level. Other variables exerting an interesting peer effect seem to indicate a direct link between grade repetition and school contexts with bad eating habits (STUBMI) or an inverse association with the students' average month of birth (AGE). As for purely school contextual variables, first we find that school ownership (SCHLTYPE) has practically no effect in the complete model. On the other hand, teacher training (PROPAT8) and school preparation for digital teaching (DIGPREP) appear to be factors that protect from grade repetition.

Non-cognitive factors include important factors associated with a higher risk of grade repetition, such as the student's obligations at home (WORKHOME), bullying suffered (BULLIED) or daily ICT use for leisure activities (ICTWKDY). The main factors that protect from grade repetition are punctuality (TARDYSD-never), not skipping class (SKIPPING-never), student's own academic expectations (EXPECEDU), academic support from family (FAMSUP) and perseverance (PERSEVAGR).

Interesting peer effects can also be found in non-cognitive factors that exercise a protective peer effect against grade repetition. Mainly: general educational expectations, punctuality, physical exercise (EXERPRAC), good student relationships with their families (SOCONPA) and general levels of assertiveness (ASSERAGR) among students. Other protective factors aggregated at school level including the use of ICTs to give students feedback (ICTFEED) and clear regulation on ICT use in school (ICTREG), as well as use of ICTs for leisure activities restricted to the weekend (ICTWKEND).

At the other end of the spectrum we find aggregated non-cognitive factors that increase the risk of grade repetition. This is the case of excessive homework (STUDYHMW), a significant proportion of students with household obligations and the use of ICTs for leisure on school days (ICTWKDY).

TABLE V. Multi-level logistic regression (logit) models

	Contextual model			Complete model		
	t	P	POR*	t	P	POR*
Intercept	-36.443	<.001		-30.161	<.001	
L1-IMMIG (natives)	-15.288	<.001	-.448	-16.184	<.001	-.607
L1-IMMIG (immigrants)	14.410	<.001	.597	12.876	<.001	.676
L1-ESCS	-78.998	<.001	-.837	-54.768	<.001	-.653
L1-GENDER (aggr.)	17.600	<.001	.131	10.971	<.001	.107
L1-AGE (aggr.)	-14.053	<.001	-.106	-5.393	<.001	-.049
L1-ESCS (aggr.)	-11.205	<.001	-.110			
L1-ICTSCH (aggr.)	14.283	<.001	.131	13.090	<.001	.123
L1-ICTHOME (aggr.)	-3.385	.001	-.026			
L1-ICTQUAL (aggr.)	-2.633	.008	-.022	9.361	<.001	.116
L1-STUBMI (aggr.)	24.246	<.001	.191	8.919	<.001	.090
L1-PROBSELF (aggr.)	-10.496	<.001	-.071	-6.800	<.001	-.069
L2-SCHLTYPE (public)	10.321	<.001	.206	-2.369	.018	-.055
L2-PROPAT8	-16.657	<.001	-.147	-7.395	<.001	-.077
L2-PROPSUPP	-3.990	<.001	-.031			
L2-DIGPREP	-8.207	<.001	-.070	-5.570	<.001	-.058
L1-SKIPPING (never)				-16.217	<.001	-.335
L1-TARDYSD (never)				-20.417	<.001	-.515
L1-TARDYSD (frequent)				4.225	<.001	.123
L1-WORKHOME				33.156	<.001	.349
L1-EXPECEDU				-53.563	<.001	-.572
L1-BULLIED				17.112	<.001	.164
L1-PERSEVAGR				-10.302	<.001	-.110
L1-FAMSUP				-13.503	<.001	-.127
L1-ICTWKDY				18.307	<.001	.202
L1-TARDYSD (aggr.)				-4.310	<.001	-.048
L1-EXERPRAC (aggr.)				-9.356	<.001	-.085
L1-STUDYHMW (aggr.)				13.614	<.001	.142
L1-WORKHOME (aggr.)				2.379	.017	.024
L1-EXPECEDU (aggr.)				-17.317	<.001	-.212
L1-ASSERAGR (aggr.)				-17.414	<.001	-.195

L1-ICTFEED (aggr.)				-19.459	<.001	-.268
L1-ICTWKEND (aggr.)				-11.337	<.001	-.202
L1-ICTWKDY (aggr.)				10.347	<.001	.194
L1-ICTREG (aggr.)				-3.169	.002	-.029
L1-SOCONPA (aggr.)				-4.158	<.001	-.047

* Proportion increase in the likelihood of repeating by increasing the predictor variable by 1 unit.
Source: compiled by authors

Both models had a good fit (Table VI) with prediction accuracy levels over 80% in both cases, although the complete model achieved significantly higher overall accuracy than the contextual model. Specifically, while the true negative rate (specificity) is around 98% in both models, the true positive rate (sensitivity) increases from just over 12% in the contextual model to almost 20% in the complete model. This low level of sensitivity is because the percentage of repeating students represents approximately one fifth of all students in the sample used, which makes it difficult to identify these subjects in the model.

TABLE VI. Regression model confusion matrix

Observed scores		Contextual model		Complete model	
		Predicted scores		Predicted scores	
		Non-repeater	Repeater	Non-repeater	Repeater
Non-repeater	Freq.	125701	2862	107292	2533
	rows %	97.8%	2.3%	97.7%	2.3%
Repeater	Freq.	25851	3573	16471	4009
	rows %	87.9%	12.1%	80.4%	19.6%
Accuracy		81.8%		85.4%	

Conclusions

The main goal was to study the relationship between contextual and non-cognitive factors and grade repetition in secondary education in Spain, distinguishing between the direct effect these factors exert at student level (L1) and the peer effect, i.e., the effect mediated by the contextual and non-cognitive characteristics of classmates. Our results indicate that, in addition to the great importance of individual factors already studied in prior literature such as family socioeconomic and cultural level, peer effect exerts a key influence on grade repetition. In view of the importance given to this matter in prior literature, we understand it to be the primary contribution of this paper.

A series of individual contextual and non-cognitive factors are related with the likelihood of repeating grade. Contextual variables include socioeconomic level and immigration status. Based on our results, gender is not associated with grade repetition in Spain—at least at individual level—the same as ICTs available in school or in the home. In this sense, there are some discrepancies with the recent study by Álvarez-García et al. (2024), which uses a data mining analytical approach and in which socioeconomic status and ICT use in the home and at school are the three main predictors of categorisation of Spanish students who completed PISA 2022. These discrepancies may be because the study by Álvarez-García et al. (2024) focuses on student grouping by similar profiles and not on identifying factors associated with grade repetition.

As for individual non-cognitive variables, the most important variables that protect from grade repetition are academic expectations, punctuality and attendance, and not having a significant load of household chores. In line with Álvarez-García et al. (2024), these results along with other, less relevant associated factors such as family support and control of ICT use for leisure at the weekend reveal how important it is for the student to be surrounded by a stable, motivating family environment that favours their personal and academic development and actively controls their academic activities.

When analysing the role of schools, the most significant contribution of this study is ascertaining that there is a significant peer effect on grade repetition in compulsory secondary education in Spain. Along with immigration status, socioeconomic level, academic expectations and attendance—variables with significant effects at student level—, aggregated school characteristics have a major link with the likelihood of repetition. This result, which apparently contradicts the results obtained by Constante et al. (2024), where

individual variables gained a much higher weight than school variables in predicting grade repetition, is explained because these authors did not aggregate L1 variables at school level. In fact, this interpretation is reaffirmed when taking into account that student grouping by school explains more than 15% of total grade repetition variability in our study. So our results confirm that, while factors exclusive to the school level (such as ownership, teacher training or support teacher availability) are marginally associated with grade repetition (Constante et al., 2024), there are school environments related with general student characteristics that exert a protective or risk effect on a student repeating a grade.

The main individual contextual characteristics that exert a peer effect on grade repetition when aggregated, with effects superior to school contextual characteristics, are the proportion of male students, presence of ICTs in the school and school activities, and bad student eating habits. These results delve deeper into the claims made by authors such as Choi (2018) who, with regard to the association between gender and grade repetition, state: not only is being male directly associated with grade repetition, but being in a school with a higher proportion of male students is associated with a higher individual likelihood of repeating a grade, regardless of the student's gender. Evidence on the peer effect of using ICTs and diet are new additions and open up new lines for future research.

As for aggregated non-cognitive variables, academic expectations again play one of the most relevant roles. Not only are personal expectations associated with repetition (Choi, 2018), but attending a school where students have low aggregate expectations increases the likelihood of grade repetition. Again we find factors linked with ICT use, although in this case with controversial results that merit more in-depth analysis in future studies: while contexts with widespread use of ICTs for leisure during the week individually increase the likelihood of grade repetition, school environments that generally use them at the weekend and to receive academic feedback from teachers exert a protective effect at individual level. This once again reveals the importance of effective parental control and support (Álvarez-García et al., 2024) and that ICT use in school is a resource for learning rather than an end in itself (Alé-Ruiz et al., 2024).

In summary, although the results obtained are in line with the literature review regarding individual factors associated with grade repetition, the fundamental development of this study is that it reveals a significant peer effect associated with grade repetition in Spain. In line with prior studies that

already pointed to this peer effect in relation to aggregated contextual factors (Ferrão et al., 2017; López et al., 2023; Nieto-Isidro & Martínez-Abad, 2023), our paper adds that aggregated non-cognitive characteristics of a school's students also exert this effect and with even more intensity than the peer effect observed in contextual factors.

The results of this study encourage us to reflect on whether grade repetition is the most appropriate measure to compensate for academic difficulties and how to use **healthy** school environments to develop the maximum individual potential of each and every student in our education systems.

Limitations and future studies

The main limitations of this study are related with the characteristics of PISA studies (González-Such et al, 2016; Jornet, 2016). Firstly, unlike other international assessments such as TIMSS or PRILS, PISA tests do not identify the student's classroom level, which makes it difficult to properly characterise the student's school environment. This limits the results obtained on the peer effect and future research is necessary on these results with more systematic data. Another essential issue is the cross-cutting nature of PISA assessments. Longitudinal student and school monitoring is not possible as PISA offers 3-yearly panel data, which limits the analysis of non-cognitive factor evolution when grade repetition occurs, making it impossible to draw causal conclusions. Finally, PISA also suffers from limitations in the context questionnaires used. In addition to being self-reported questionnaires, linked to problems of social desirability, given their length and scope, they attempt to measure complex traits and factors with a very limited number of items, affecting their validity.

The specific limitations of this study include that only data from the Spanish sample were used given the particular prevalence of grade repetition in our education system. This may make it difficult to generalise results. Also, variables were pre-selected due to the volume of variables available in PISA 2022. Furthermore, PISA 2022 does not include information on cognitive factors such as intelligence or basic psychological processes so some relevant variables may have been omitted, an issue that can be addressed in future studies.

Taking into account these results and current debate on the use of ICTs in education, future studies on the role of ICTs in repetition would be of unquestionable interest as their individual and aggregated effects are unclear in

this study. Future longitudinal studies that focus on studying how the change in group levels of non-cognitive factors whose peer effect has been detected in this study individually affect grade repetition are also recommended.

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The Second chance education model in Spain as an effective model

El modelo de segunda oportunidad educativa en España como un modelo eficaz

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Abstract

Early school leaving is a phenomenon that places adolescents and young people in a vulnerable position regarding to their future labour and social integration. Many of these young people already have personal, economic, social, or family constraints before leaving the school system, which increases their vulnerability. The aim of this article is to analyse and present second-chance schools (SCS) in Spain as an effective and successful alternative that allows young people aged 15 to 29 who have left school prematurely

to return to the education system and move towards employment with more chances of success. The research focuses on the analysis of data that the Spanish Association of Second Chance Schools (SCS Association) collects through standardised tools regarding the training offered, the functioning of the school and the indicators of its activity in terms of the results obtained. As an innovative aspect, the Association has its own accreditation process structured around 29 items, in which independent audits are carried out to guarantee quality standards in educational processes and practices in terms of: the social and professional integration of students; the development of skills; collaboration with public administrations and companies; and networking. They offer training in different professional fields with a variety of types and durations, which allows them to adapt to the needs and characteristics of each young person. Their work, structured around key areas such as the individualisation of pathways and the development of transversal skills, which are fundamental not only for professional development but also for life, makes SCS as an educational and social benchmark, backed by a 63% success rate in return to education or finding a job six months after leaving school.

Key Words: second chance schools, individualized education programs, disadvantaged youth, vocational education and training, early school leaving

Resumen

El abandono educativo es un fenómeno que sitúa a adolescentes y jóvenes en una posición de fragilidad ante su futura inserción laboral y social. Muchos de estos jóvenes ya cuentan con condicionantes personales, económicos, sociales o familiares previos a la salida del sistema escolar, lo que aumenta su vulnerabilidad. Este artículo tiene como objeto analizar y presentar a las escuelas de segunda oportunidad (E2O) en España como una alternativa eficaz y de éxito que permite que jóvenes de 15 a 29 años que han abandonado prematuramente los estudios, retornen al sistema educativo y transiten con mayores garantías hacia el empleo. La investigación se centra en el análisis de datos que la Asociación Española de Escuelas de Segunda Oportunidad (Asociación E2O) recoge a través de herramientas estandarizadas en torno a la oferta formativa, el funcionamiento de la escuela y los indicadores de su actividad en cuanto a los resultados obtenidos. Como aspecto innovador, la Asociación cuenta con un proceso de acreditación propio estructurado en 29 indicadores, en el que se realizan auditorías independientes que garantizan unos estándares de calidad en los procesos y práctica educativa en torno a: la integración social y profesional del alumnado, el desarrollo de competencias, la colaboración con administraciones públicas y empresas y el trabajo en red. Ofrecen formación en distintos ámbitos profesionales con diversidad en cuanto a su tipología y duración, lo que permite adaptarse a las necesidades y características de cada joven. Su trabajo vertebrado en ejes clave como la individualización de los itinerarios y el desarrollo de competencias transversales, fundamentales, no sólo para el desarrollo profe-

sional sino también para la vida, posicionan a las E2O como un referente educativo y social, avaladas por una tasa de éxito del 63% -retorno educativo o inserción laboral a los seis meses de la salida de la escuela-.

Palabras clave: Escuelas de segunda oportunidad, Programas de educación individualizados, Juventud vulnerable, Formación Profesional, Abandono educativo temprano.

Introduction. The second chance

For decades, the concept of employability has been under review in response to constant and rapid changes in the labour market (Gazier, 2001; Llinares et al., 2020; McQuaid & Lindsay, 2005). From the disability and ability to work dichotomy at the start of the 20th century (Mäkikangas, et al., 2013), by the 1960s and 70s employability was defined as the appropriate fit between professional competence and the demands of the labour market. In the 1980s, the concept of employability expanded to cover the ability to find a job, keep it, and acquire job-seeking competences (Gazier, 2001). Competences started to be understood as key for accessing work (Rothwell & Arnold, 2007 as cited in Mäkikangas et al., 2013). The rapid transformation of the workplace, increased volatility and segmentation, increase in temporary contracts, highly transitory cyclical unemployment, digitalisation, offshoring, etc. have a significant effect on young people, especially the most vulnerable ones (Ficapal-Cusí & Motellón, 2022; Romero-Rodríguez et al., 2022). This new scenario requires people to have a different relationship with work and training, based on their capacity for adaptability, flexibility, and continuous retraining to face multiple incidences of joining and leaving the labour market throughout their lives, aspects that are embedded in the concept of employability. This shift entails expanding intervention for social and workplace inclusion into other areas such as personal development, better interpersonal relations, self-determination, self-knowledge, the capacity to choose for oneself, and comprehension of one's own identity, questions that point beyond accessing a job as a guarantee of social and workplace inclusion (Serrano, Martín, 2017; Zugasti, 2016). The working model of second chance schools responds

to the challenge of this new context by integrating three key elements into its model: transversal competences, personalised accompaniment, and the concept of positive leaving.

The problem of early school leaving and school failure cannot be addressed by a vision centred solely on formal education and the school as the educational institution of reference. Instead, it must include a broader outlook that encompasses the elements and phenomena that this educational and social exclusion generate (Tárraga-Mínguez et al., 2022).

Pedagogical and didactic movements centred on individual attention have resulted in a more human and personalised teaching model that focusses the process of education on a model that centres students, accommodating their capacities and interests as individuals to minimise harm to them from the homogenisation of education by educational institutions (Guerrero & Ruiz, 2020).

In order to respond to these harms and experiences of school failure owing to the homogenisation of education, in 1995 the European Commission set out the foundations of the response to this problem for vulnerable young people through its white paper on education and training, *Teaching and Learning: Towards the Learning Society*, providing the organisational structure for second chance schools as the instrument to facilitate access to training, the labour market, and active citizenship (European Commission, 2001).

The European Commission's white paper on education (1995) identified five objectives in the field of education that states should implement policies to achieve. It is in the third objective, combating exclusion, offering a second chance through schools, that the pilot experience of second chance schools as a response to this need is born. The European Commission itself has identified the experiences of second chance schools as those that can offer the best educational provision to students who have been excluded from the formal education system so that they can continue with their training and work on developing their socio-emotional aspects (Corchuelo Fernández et al., 2016; European Commission, 2001).

Second chance schools centre on young people who have either had an unsuccessful experience of education or have not acquired the qualifications and basic skills needed to access the labour market or whose personal

situation prevents them from accessing or continuing in the mainstream training system. For this reason, the second chance is understood as the bridge towards optimal social and workplace insertion. Redressing these difficulties frames the principal objectives to be developed by second chance schools (European Commission, 2001; García-Montero, 2018).

Two second chance schools from Spain participated in this European pilot scheme – one from the Basque Country and the other from Catalonia – but it was not until 2015 that a group of third-sector social-action bodies from different parts of Spain, with wide experience and long track records of working with young people in situations of exclusion from the formal education system, decided to start establishing the network of second chance schools – SCSs since their appearance in Spain – (García-Montero, 2018; Thureau, 2018).

Spain's SCS network started by using its French counterpart as a reference point in direct contact with the SCS of Marseilles. The first six institutions that defined and structured the Spanish second chance school model were Fundación Adsis, Fundación El Llindar, Fundación Federico Ozanam, Peñasal Kooperatiba, Fundación Don Bosco, and Fundación Tomillo. On 11 November 2015, these institutions signed the manifesto¹ and charter of fundamental principles² of Spanish SCSs and in early 2016 the Asociación Española de Escuelas de Segunda Oportunidad – SCS Association – was formally established (Thureau, 2018).

The SCS Association has implemented its own model set out in 29 indicators grouped into five dimensions: recognition of the SCS model by public administrations; professional and social integration of unemployed young people who are outside the education system or at risk of exclusion from it; social and professional competence development; collaboration with businesses; and networking. Accordingly, the Association defines the SCS model as an effective socio-educational intervention model of proven quality that has the primary objective of improving the situation of unemployed young

1 Manifesto para la constitución de la red española de escuelas de segunda oportunidad (E2O), (Manifesto for establishing the Spanish Second Chance Schools network). https://www.e2oespana.org/wp-content/uploads/2016/04/Manifiesto_E2O_111115.pdf

2 Carta principios fundamentales de las escuelas de segunda oportunidad (E2O) en España (Charter of Fundamental Principles of Second Chance Schools in Spain). https://www.e2oespana.org/wp-content/uploads/2016/04/Principios_E2O_111115.pdf

people who have been excluded from the education system (García-Montero, 2018; Thureau, 2018).

The history of the SCS Association is still relatively short. However, numerous studies have focussed on defining the target population of SCS institutions, as well as their contribution to personal and social development, reincorporation into the education system, and subsequent workplace insertion (González-Faraco et al., 2019.; Fernández et al., 2014; Tárraga-Mínguez et al., 2022).

Description of the SCS Association

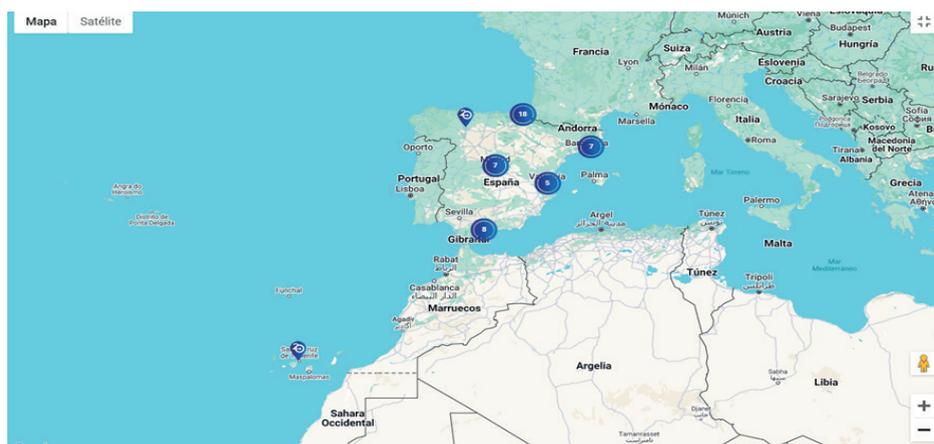
SCSs offer young people who have been excluded from the formal education and training system an alternative model based on innovative standards aimed at minimising early school leaving and school failure (European Union, 2017; Fernández et al., 2014; Tárraga-Mínguez et al., 2022). In Europe, the movement of this type of schools shares some common principles, but the intervention and action models are adapted to the context of each country where they are located. In the case of Spain, the birth of the SCS Association in 2016 set a benchmark in relation to the other European SCS associations by implementing a standardised accreditation process for SCSs (García-Montero, 2018).

SCSs in Spain cater for young people aged from 15 to 29 years with a record of negative experiences of the education system, low or no academic training, and who have experienced unemployed or have experience of work that requires few qualifications. Their aim is to facilitate access to the labour market, offering practical training, or return to the formal education system to continue with official training (Martínez-Morales et al., 2024).

Until the publication of *Organic Law 3/2022, of 31 March, regarding the organisation and integration of Professional Training*, references to the second chance in Spain did not have an official definition. In this legislation and with the implementation resulting from it, this term is used in official texts, and there is even a specific article dedicated to discussing these centres. In view of this situation that was caused by a lack of regulation and with no specific legal framework for SCSs in Spain, the SCS Association

itself developed a standardised accreditation process that makes it possible to identify institutions that have intervention processes with the quality standards defined by the Association's own model. This accreditation process has made the network a benchmark in Europe (García-Montero, 2018). As Figure I shows, the process that bodies from the social action third sector must submit to if they want accreditation has identified and accredited a total of 47 second chance schools (as of 31/12/2024) across in 10 autonomous communities (Martínez-Morales et al., 2024). At the time of writing of this article, three more institutions have successfully completed the accreditation process and are awaiting formal ratification by the Association.

FIGURE I. Distribution of Formally Accredited SCSs in Spain as of 31 December 2024



Source: Second chance schools (SCS) accredited in Spain (accredited units) extracted from the website of second chance schools in Spain. <https://www.e2oespana.org/unidades-acreditadas/#1664547208847-a6c1ef54-284b>

The variety of types of schools that make up the Association is also a distinguishing feature, as while it was established relatively recently (2016), a large majority of the member organisations have a record of decades working with the population of young people excluded from the education system using a pedagogical methodology in line with the SCS model (Marhuenda et al.; 2022; Marhuenda et al., 2024). Based on the data in Figure II, within

this diversity we can find bodies with a wide range of legal structures, with these foundations being the most numerous type, followed by cooperative associations and federations.

FIGURE II. Legal Structure of Accredited SCSs in Spain



Source: Marhuenda Fluixá, F; Chisvert Tarazona, M.J (Eds). OTR2020-21121INVES contract, signed between the Universitat de València and the Asociación Española de Escuelas de Segunda Oportunidad. Retrieved January 22, 2025, from www.madreams.es

Most of the organisations that are members of the Association are bodies with strong local roots in the area where they are based, normally linked to neighbourhood or community action movements in the districts where they are located. These local roots give them a high level of recognition by other social organisations, by the administration, and by users, which to a great extent makes them benchmarks at a local and autonomous-community level (García-Montero, 2018; Marhuenda et al., 2024; Martínez-Morales et al., 2024).

A third of the total of SCSs derive from social work by religious bodies, which, through their social initiatives, promoted direct intervention with residents of the most vulnerable neighbourhoods. These bodies that support them, mainly do their educational work in the field of formal education by implementing an educational offer in compulsory secondary education or in formal professional training. At the same time, there is a smaller group among

the total number of schools that has an organic basis close to the social economy (Marhuenda et al., 2024).

The process of accreditation of an SCS

The SCS Association has a defined process for accreditation as an SCS (Asociación Española de Escuelas de Segunda Oportunidad, 2017, 2022). The structure of this uses the Association's charter of principles as a benchmark (Asociación E2O, 2015), which is based on the conclusions of the original model developed by the European Commission in its pilot project for this type of school (European Commission, 2001). The Spanish model has 5 basic principles:

- Recognition by the administrations.
- Lasting social and professional integration of the group.
- Personal, social and professional competence development.
- Collaboration with businesses.
- Networked activity.

This points towards a principal goal to “facilitate analysis of the processes carried out in the school and to help with the qualitative improvement of these processes, steering decision making to lead to excellence” and a secondary goal, the logical outcome of the process: “To value the functioning of the school in reference to the SCS model in Spain facilitating the decision to accredit it as a Second Chance School, by the Association” (Asociación E2O, 2017, 2022, p. 7, authors' own translations).

The application of the process is structured around 29 indicators, grouped into the model's different principles. These indicators have been defined by people from the association itself, experts in the field of early education leaving, training, and the field of employment, and they have been validated by academic experts from the university sector and professionals in evaluating education.

Analysis of this model shows that it supports schools that:

- have the backing and recognition of the public administrations responsible for the education, training, and labour integration of young people with difficulties;
- operate with approaches aimed at young people achieving stable, long term social and professional integration in the social setting where they live;
- have a holistic educational offer that includes the development of personal, social and professional competences, not just academic ones, and to do so use methodologies and teaching practices that are innovative, inclusive, and facilitate an individualised response to each person's needs;
- involve in their activity the businesses that form part of the productive framework of the ecosystem of which they form a part;
- and are characterised by maintaining cooperation and an approach of networked activity with stakeholders from their own setting and from others (health–healthcare, social, residential, protecting children and young people, etc.) which are necessary for consistency with the holistic approach to the development of a person.

The process is based on collegiate self-evaluation by the professionals responsible for management and organisation in each school as well as independent audits that confirm the existence of evidence that supports the schools' self-evaluation. In the case of any discrepancy, it is adapted, on the basis of the descriptors and criteria of the process itself. As a result, an overview of the educational practice of the school is obtained, according to the model of standards of excellence defined by the Spanish association.

The accreditation process as a whole features a diverse and periodically renewed committee of experts to ensure that the actions (self-evaluations, audits, follow-up, collection of valuations and submissions, analysis and conclusions, etc.) done in it have a guarantee of quality and good functioning. In addition to this, with all of the information obtained, and in contrast with the Association's governing bodies, proposals are made for improving the process itself.

Consequently, the configuration of the second chance model in Spain

is dynamic and constantly developing, and it can adapt to the social reality in which SCSs carry out their activity.

Types of students attending SCSs in Spain

As Palomares et al. (2024) observe, early school leaving is a standardised indicator that can be compared across Europe that refers to young people who do not achieve a minimum level of secondary education qualifications.

The profile of young people that make up the students in second chance schools is very diverse and varied. Its is strongly marked by the institutional design of the SCS programme, fundamentally for young people with negative educational trajectories who come from disadvantaged social settings and are in a situation of risk and/or social exclusion (Martínez-Morales et al., 2024; Palomares et al., 2024; Tárraga-Mínguez et al., 2022).

The SCS Association itself defines the descriptor variables to be considered in the profile of the people who form part of the schools (Asociación E2O, 2017, 2022, pp. 2). These relate to their age, academic qualifications, academic situation and employability, and social integration profile (Table I).

TABLE I. Identifying Characteristics of the SCS Collective at the Time They Join the School

Age	Qualifications	Academic situation	Employability and social integration profile
Being aged between 15 and 29 years, according to a criterion of academic age and reaching that age during the year that the academic year begins.	Not having a post-compulsory secondary or higher qualification	Fulfilling one of the following conditions: <ul style="list-style-type: none"> • Being enrolled in an educational centre with measures for attention to diversity that allow study outside mainstream compulsory education centres. • Having completed the mainstream schooling stage, with or without success. • Coming from education systems in countries other than Spain and having difficulties in being able to join the formal education system. 	Fulfilling one of the following conditions: <ul style="list-style-type: none"> • Not having an accredited professional qualification. • Not meeting the criteria to access academic qualifications or certifiable or accredited training that includes a level 2 professional qualification. • Being unemployed.

Source: Produced by the authors based on the accreditation process of the SCS Association (2017, 2022, p. 2).

The various studies of SCSs that have been done (Marhuenda et al., 2024; Merino-Pareja & García-Gracia, 2022; Palomares, Palomares et al., 2024) have found that students from SCSs in Spain are fully diverse and heterogeneous. One key aspect of their students in Spain is that the majority are male, with $\frac{3}{4}$ of the total being male compared with $\frac{1}{4}$ female. In this case, the phenomenon of masculinisation of school leaving is maintained, as García (2011) notes. Furthermore, there is evidence of the situation of exponentially increased vulnerability of female students in a school-leaving situation that makes them even less visible (Merino Pareja & García-Gracia, 2022).

The bulk of the SCS population are in the 15 to 20 years age bracket, with this population group representing more than 50% of all of the young people from SCSs, although it is true that the population as a whole is aged between 15 and 29 years and they participate in the different programmes indistinctly without being distributed by age ranges.

The family situation of most of the young people is suboptimal and precarious considering economic capital as well as cultural capital. More than half of the families have major financial challenges to reach the end of the month, although a small percentage reports not having this issue. With regards to cultural capital, the parents' level of studies is low or none. A small percentage stand out for having parents with university level studies, in line with what has been observed by García Gràcia and Valls (2018) who indicated that the disconnection from higher education is not exclusively an indicator of families from a low social background (Palomares et al., 2024).

The background or country of origin is also a characteristic of the group of SCS students. Migrants make up 1/3 of the total people at these schools. This aspect reflects the vulnerability of young migrants, who have a higher likelihood of leaving education and face greater challenges in achieving a degree of continuity in their path through Basic Professional Training (García Gràcia & Valls, 2018).

The characteristics described indicate that within the population group aged from 15 to 29 of SCS students, numerous diverse and heterogeneous factors define people as individuals, confirming the great diversity of the group of young people who participate in SCSs in Spain.

Description of the data collection process. Procedure and instruments

The data collection process is arranged in three fields: the training offer; the functioning of the school; and the indicators for its activity with regards to the results obtained. To do this, a series of standardised files sent by each school to the association and a digital app with access by username and password are used.

Training offer

Instruments

Each school completes a data collection table and submits it to the Association before being accredited for the first time and then submits it periodically (annually). The table displays identifying details, in some cases from a closed list of answers, about the accredited school and about the following variables:

- Name of the training offered
- Total number of students
- Ratio of students per group
- Professional family
- Value and effects of qualification and certification
- Benchmark professional qualification level (where applicable)
- Business experience
- Funding source
- Notes

Process

The data collection is done for each previous academic year. This timetable coincides with the submission of data by each school in relation to the activity and results indicators.

The data about the training offer of accredited SCSs in Spain collected in this article refer to the 2022–23 academic year. The most up to date ones at the time of writing are included.

Functioning of the school

Instruments

The collection of data about the functioning of the school uses tools constructed specifically for the process of accreditation as an SCS (Asociación E2O, 2025). The main one is the **SCS accreditation scale** (Annexe I), which is a Likert-type scale with 29 indicators, grouped according to the 5 principles of the SCS Association. Each indicator has 5 levels of excellence (Excellent, Good, Satisfactory, Unsatisfactory, and Not fulfilled). Each one has a descriptor or rubric. Taking these into account, the school must evaluate itself, identifying the features of its practice and evidence to support them (Asociación E2O, 2017, 2022, pp. 20-31). As auxiliary elements to help carry out this process, with the due rigour there is a **frequently asked questions document**, including doubts about each indicator and the key criteria and elements to use to define the level of excellence, and also **digital tables** that set out the responses to the scale, the evidence associated with each response, and the school's identifying details.

Process

Depending on when a school decides to enter itself for the accreditation process, it sends the association the self evaluation based on the scale and requests a visit by the professionals from the independent agency who perform the in-person audit to validate the supporting evidence for the self-evaluation. After this audit, a report is issued on its result with the level of excellence achieved by each school on each of the indicators with comments on its functioning. A school's positive accreditation is valid for 4 years, and has to be renewed through another audit. In each period between audits (2 years from the audit), a follow-up of the situation of the accredited SCS is performed by experts from the association.

The data regarding the functioning of accredited SCSs in Spain collected in this article refer to each school's most recent audit, dated 31 January 2025, and were provided by the SCS Association.

Indicators of activity and results obtained

Instruments

A table is used to collate data on activity indicators that each school completes periodically and submits to the Association (annually by periods of September–August academic year). The table includes indicators regarding:

- Student numbers;
- Their profile in accordance with the following variables:
 - Gender
 - Age
 - Nationality
 - Age
 - Academic level when joining
 - Qualification level when joining
 - * Results according to the following variables:
 - Number of young people who leave the SCS
 - Academic level when leaving
 - Qualification level when leaving
 - Stability and Duration of the SCS pathway
 - Situation 6 months after leaving according to the positive result index (success rate)
- Data on the figures of the SCS (hours of training, number of professionals and budget)

Process

As positive leaving (success rate) is collected in the activity indicators and this is measured 6 months after leaving the E2O, the data collection, which is done annually and by academic year, is requested from each accredited school in the period between February and April.

“The success rate measures the situation of the young people who have left the E2O (a part of the students). The rate shows the people who have

joined the labour market or formal or non-formal training in another centre six months after leaving.” (Asociación E2O, 2025).

Educational offer and characteristics of SCSs in Spain

Training offer

At the end of the 2022–23 academic year, 46 schools in Spain were accredited as SCSs. Of these, according to the type of offer (Table II):

- Twenty-six (57%) offer training integrated into the formal education system, although 11 of these do so solely through autonomous-region measures of attention to diversity that enable the externalised schooling of 15-year-old students in schools other than compulsory secondary education schools³.
- Fourteen (30%) offer qualifications from the professional training system (Grade D in the terminology of Spain’s new professional training system).
- Eighteen (39%) offer non-formal training programmes promoted and formal by the competent educational administration in that autonomous community.
- Thirty-two (70%) provide a very broad and diverse offer of non-formal training programmes, with a wide range of values and effects as a result of successfully completing them: certifications of qualifications of a variety of levels and degrees from the employment system, certifications that are only of value and effective within the autonomous community, unofficial certifications.

³ Programas Complementarios de Escolarización (Complementary Schooling Programmes, Basque Country), Aulas Taller (Workshop Classrooms, Aragon), Unidades de Escolarización Compartida (Shared Schooling Units, Catalonia), Programa de Currículo Adaptado (Adapted Curriculum Programme, Navarre), Aulas de Compensación Educativa (Educational Compensation Classes, Madrid), Compensación Educativa (Educational Compensation, Andalusia).

TABLE II. Descriptive analysis of the distribution of schools accredited as SCSs in Spain by type of offer.

Type of training	Type of system	Number of SCSs offering it (percentage of the total population)
Attention to diversity measures in SCSs that integrate students aged 15	Formal training	16 (35%)
Basic PT	Formal training	14 (30%)
Intermediate Training Cycles	Formal training	5 (11%)
Advanced Training Cycles	Formal training	1 (2%)
Non-formal training programmes promoted by autonomous community-level educational administrations	Non-formal training	18 (39%)
Other programmes	Non-formal training	32 (70%)

Source: Produced by the authors based on data from the SCS Association.

As for their duration (hours of training of the programme or level of teaching) per student, the analysis of the variety of the offer is very broad. A total of 125 different values were collected, ranging from 3 to 1,330 hours per academic year (annual) period⁴. Some of the training offers are multi-year (e.g. the formal PT training cycles), although enrolment must generally be renewed in each academic year. It is especially significant how, by using very diverse programmes with different hours and conditions, each SCS builds an individualised training itinerary for each student tailored to his or her needs, guaranteeing the possibility of creating an educational pathway of at least two years duration, in accordance with each person's situation.

With regards to funding, the wide range of programmes and qualifications is also reflected in this area. The bulk of the funding (Table III) comes from the public administrations of the autonomous communities, most notably the ministries of education and employment (generally in separate departments in almost all of the autonomous community governments). However, a not inconsiderable number draw their funding from private sources (generally

4 No table of details is given for reasons of space.

foundations and businesses), the funds of the bodies that own the school, or other sources (European Social Fund, multiple public administrations, or others).

TABLE III. Descriptive Analysis of the Distribution of Schools Accredited as SCSs in Spain by Funding Source

Funding source	Number of programmes or qualification lines
Autonomous Community Government (Education)	150
Autonomous Community Government (Employment)	53
Autonomous Community Government (Education & Employment)	12
Private funding	65
Mixed (public and private funding)	55
European Social Fund (ESF)	11
Own funds	27
Multiple Administrations	8
Others	83
TOTAL	464

Source: Produced by the authors based on data from the SCS Association

Functioning of the school

With regards to the functioning of the schools, data are presented relating to the level of excellence of each unit with regards to the SCS model according to the result of the most recent audit (Table IV). These show the percentage of distribution of the total population of accredited SCSs in each indicator on the scale for SCS accreditation. The accreditation model has 18 indicators considered essential (shown in **block**) and 11 complementary ones.

TABLE IV. Descriptive analysis of the distribution of schools accredited as SCSs in Spain by level of excellence.

INDICATOR	LEVEL OF EXCELLENCE				
	Excellent	Good	Satisfactory	Unsatisfactory	Not fulfilled
Collaboration with public administrations	46%	26%	28%	0%	0%
Stability of financial and structural resources of the SCS	38%	24%	38%	0%	0%
Stability of human resources of the SCS	90%	8%	2%	0%	0%
Involvement in standardised SCS model	30%	58%	12%	0%	0%
Voluntary involvement of young people in the SCS	48%	46%	6%	0%	0%
Duration of training pathway	74%	24%	2%	0%	0%
Individualisation and flexibility of learning environment	66%	32%	2%	0%	0%
Offer of alternative pedagogical model	56%	36%	8%	0%	0%
Return to formal system and access to work	62%	16%	16%	6%	0%
Offer of PT with benchmarks recognised in national training & qualifications system	22%	50%	28%	0%	0%
Guidance and monitoring of the young person	26%	26%	48%	0%	0%
Equality of opportunities	94%	4%	2%	0%	0%
Holistic attention	23%	41%	36%	0%	0%
Protection of minors and vulnerable people	58%	38%	4%	0%	0%
Work on socio-personal and technical-professional competences	64%	26%	10%	0%	0%
Adaptation and individualisation of programme	76%	22%	2%	0%	0%
Work on key competences	30%	38%	32%	0%	0%
Influence of labour market on the training design	26%	30%	44%	0%	0%
Work with Life Projects	64%	32%	4%	0%	0%
Promotion of values in young people at the SCS	50%	32%	18%	0%	0%
Business involvement in training	38%	32%	22%	8%	0%

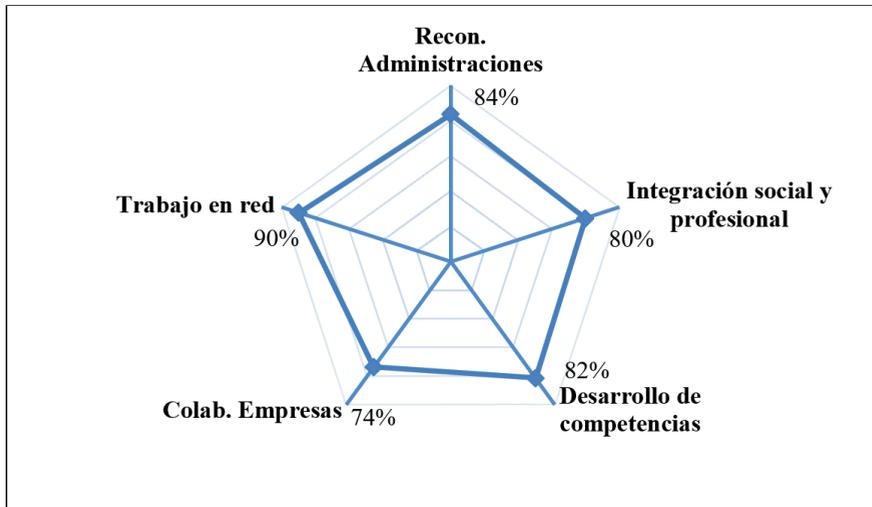
Alignment of interests between young people and world of work	20%	30%	48%	2%	0%
Awareness raising in businesses and CSR	46%	30%	20%	4%	0%
Involvement of business in design of training	22%	26%	52%	0%	0%
Business placements for young people in the SCS	70%	14%	16%	0%	0%
Coordination of SCS with complementary stakeholders	86%	8%	6%	0%	0%
Systematising of networked activity	78%	14%	8%	0%	0%
Involvement in SCS Association	76%	8%	6%	0%	10%
Intervention with people aged under 15	46%	26%	28%	0%	0%

Source: Produced by the authors based on data from the SCS Association.

These data show that the proportion of schools achieving ratings of Good or Excellent in 14 of the indicators is $\geq 85\%$ (levels of excellence in **block**), which makes these the main strengths of the functioning of this type of school.

When viewing the level of excellence of the operation of the whole population of accredited SCSs in Spain (Figure III), it is apparent that they achieve a minimum value of excellence of 74% of the total (Business Collaboration axis) and a maximum value of 90% (Networked Activity axis). The degree of excellence stands out with a high value in all of the axes of analysis.

FIGURE III. Level of Excellence by Principles Axes

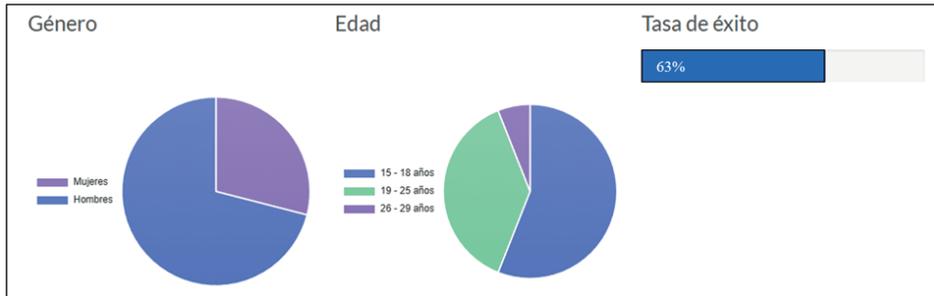


Source: Produced by the authors based on data from the SCS Association.

Activity indicators and results obtained. Positive result (success rate)

According to the activity indicators (Asociación E2O, 2025), in the 2022–23 academic year, 8,493 young people received training in 46 SCSs in 10 Autonomous Communities with the support of 957 professionals. Most of them were male (71%) and were aged between 15 and 25 years (94%), as Figure IV shows.

FIGURE IV. Population Distribution of Students by Gender and Age Success rate.



Source: Asociación E2O, 2025. <https://www.e2oespana.org/datos-clave/>

The success rate is defined in the SCS Spain model as people who have joined the labour market or are in formal or non-formal training in another centre. This rate is measured six months after leaving the training centres. A longitudinal analysis of the success rate indicates that this has always been above 60%. Bearing in mind that the population served comprises young people who are excluded from the mainstream education system, cannot access it, or have major difficulties in so doing and are at a serious risk of professional and social exclusion, these are very important figures, representing more than 5,000 people each year who escape successfully from a situation of serious risk of social professional and academic exclusion.

Limitations and new lines for future research

This study considers SCSs that are accredited and are involved with the Association. In Spain there are other educational mechanisms that implement actions within the particular sphere of the second chance but are not connected to the Association, and so while this study does cover a highly significant amount of this reality, it does not reach the whole of the currently existing population of providers of these characteristics.

The following are desirable new lines of future research related to the aim of this study:

- Analysing the value and effects of the training offer of SCSs

- by autonomous communities.
- Study of the context of second chance schools, in relation to their stability and integration in the education system.
- Good practices in SCSs in creating flexible and individualised learning pathways, as well as in the processes of accompaniment and guidance of collectives facing difficulties.

Conclusions

The roll-out and social recognition of each school in the territory is one of the keys for the success of the SCS model as it enables a flexible response that is adapted to the setting where it carries out its transformational activity. This aspect makes them social benchmarks and organisations that give coherence to the areas where they are located.

The networked activity of SCSs, understood as a collaborative space for generating shared knowledge, involves a process of constant critical reflection, self-evaluation, and updating that, in the case of the SCS Association, has been able to develop standardised models that guarantee the quality of the actions, such as the independent audit model.

SCSs are part of and to some certain extent also influence active employment policies, thus seeking to meet the needs of young people whom public intervention has been unable to reach effectively. For this reason, SCSs create individualised socio-training pathways, preferably aimed at each one of the young people that they serve (Marhuenda et al., 2024). These training pathways take into account the circumstances with which each young person first enters an SCS, at a social, emotional, contextual, competency etc. level, defining and shaping the start or joining of different training processes that can be facilitated from it. This flexibility in the creation of training pathways is, in part, facilitated by the acquisition of basic, transversal and technical-professional competences, as key elements in their intervention in all of the programmes of the SCSs. Competence-based work in young people's personalised pathways allows greater individualisation of the intervention in

line with working standards and the setting of indicators of acquisition of these competences that facilitate personal reconstruction, re-engagement with training in the education system, and social-labour insertion (Tárraga-Mínguez et al., 2022).

Thanks to their flexibility, these schools have the capacity and options to integrate training of very varied types and durations into the design of these pathways very naturally (professional training, occupational training, formal training, businesses courses and placements, certificates of professionalism, etc.). This enables them to overcome the compartmentalisation that often exists between the different training offers and the responsible authorities. These types of training, linked by the idea of the pathway, are integrated and made meaningful.

The diversity of training activities is a factor that facilitates young people's integration and success in the education–training system. Each person's initial circumstances (competences, personal, social, or family) shapes the commitment, motivation, and availability with which he or she attends an SCS. This diversity allows all young people to choose from different training possibilities, which they can also combine, to reach the same goal. Some young people cannot initially commit to long-term training (one or two years) for a variety of reasons, such as previous experience of failure, because they are still defining their professional goals, or because their personal or family economic circumstances, for example, do not permit it. Nonetheless, many SCSs provide other training possibilities under standards of quality that favour the development of pathways with commitments that are adapted to their needs and that enable them to take decisions on their professional careers.

The working model of SCS schools addresses the challenge of including young people who face greater difficulties. It does this by including three key elements: transversal competences, personalised accompaniment, and the concept of positive leaving. Transversal competences are life competences relating to attitudes and behaviours that favour the appropriate development of performance in social and workplace settings (self-knowledge and self-confidence, team work, interpersonal relations, responsibility, managing emotions and conflicts, and tolerance) (Villardón-Gallego et al. 2020). Personalised accompaniment, which considers personal, social and cultural characteristics

(López-Bermúdez et al., 2024), is centred on models of socio-labour guidance adapted to the needs of each young person that go beyond a basic strategy intended for technical-professional preparation in order to access employment. The success rate is based on the concept of positive leaving, which involves acquiring the transversal competences that enable young people to be masters of themselves, undertake actions purposefully, choose what type of actions to undertake to influence and change their own situation, and recognise their own strengths and interests, that is to say, building agency, which is understood as key to handling the uncertainty of working life (Salinas, 2022). Accordingly, the SCS Association's working model coherently connects young people's development of transversal competences with their capacity to take decisions and their ability act to drive change in their lives as a guarantee of positive leavings, something that involves reconsidering the concept of employability with a broad perspective.

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Annex I

Asociación Española de Escuelas de Segunda Oportunidad (31 de enero de 2025). Escala para la acreditación E2O. https://www.e2oespana.org/wp-content/uploads/2025/01/Escala_acreditacion_E2O_2022.pdf

Second Chance Schools: An Exploratory Scoping Review

Escuelas de Segunda Oportunidad: una revisión sistemática exploratoria

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Abstract

Early school leaving is linked to unemployment, social exclusion, poverty and poor health. There are many reasons why some young people leave their studies and training prematurely, such as the organization of the education system, the school climate and relationships between teachers and students. Second Chance Schools (E2C) offer an educational model designed for young people who have dropped out of the traditional education system or have failed in it due to social, financial and/or family issues. These schools offer a second chance for them to continue and complete their education, thus improving their future academic and employment prospects. The aim of this scoping review is to discern the issues that have been studied in E2C research and the main characteristics and outcomes of these educational programs on the young people who participate in these schools. Four databases were consulted (SCOPUS, WOS, DIALNET and ERIC). A total of

145 documents were found, with the final sample being 17 manuscripts. Most of the young people attending the schools are males between the ages of 15 and 24 with culturally diverse and vulnerable socioeconomic backgrounds. The findings indicate that E2Cs impact a number of functions of education, ranging from reentry and educational certification to preparation for employment, personal development, and social integration. They focus on improving skills, fostering self-knowledge and inclusion, supporting emotional wellbeing and active participation in society and the job market. The student profiles and the types of programs and interventions at these schools are also addressed. The study has helped consolidate and disseminate knowledge about how E2C works and its pedagogical implications. Conclusions are provided with regard to public policy in education.

Key words: scoping review, second chance schools, vulnerable youth, competencies, early school leaving, school failure, school absenteeism, educational reintegration, inclusive education, alternative education.

Resumen

El abandono escolar prematuro está vinculado al desempleo, la exclusión social, la pobreza y la mala salud. Existen muchas razones por las que algunos jóvenes abandonan prematuramente sus estudios y su formación como son la organización del sistema educativo, el clima escolar y las relaciones entre profesores y alumnos. Son las Escuelas de Segunda Oportunidad (E2C) un modelo educativo diseñado para jóvenes que han abandonado el sistema educativo tradicional o han fracasado en él debido a problemas sociales, económicos y/o familiares. Estas escuelas ofrecen una segunda oportunidad para que puedan continuar y completar su educación mejorando así sus perspectivas de futuro tanto académicos como laborales. El objetivo de la revisión es conocer qué estudian las investigaciones acerca de las E2C así como las principales características y resultados de sus programas formativos en los jóvenes que participan en estas escuelas a través de una revisión sistemática exploratoria. Las bases de datos consultadas han sido cuatro (SCOPUS, WOS, DIALNET y ERIC). Un total de 145 documentos fueron encontrados siendo la muestra final de 17 manuscritos. La mayoría de los jóvenes que asisten a las escuelas son varones entre los 15 y 24 años y de diversidad cultural que provienen de contextos socioeconómicos vulnerables. Los hallazgos indican que las E2C impactan en diversas funciones de la educación, desde el reingreso y la certificación educativa, hasta la preparación para el empleo, el desarrollo personal, y la integración social. Estas se enfocan en mejorar habilidades, fomentar el autoconocimiento y la inclusión, apoyar el bienestar emocional y la participación activa en la sociedad y el mercado laboral. Asimismo, se aborda el perfil de los estudiantes y los tipos de programas e intervenciones de estas escuelas. El estudio ha contribuido a consolidar y difundir el conocimiento sobre el funcionamiento de las E2C y sus implicaciones pedagógicas. Se ofrecen implicaciones para las políticas públicas educativas.

Palabras clave: revisión sistemática exploratoria, escuelas de segunda oportunidad, jóvenes vulnerables, competencias, abandono escolar temprano, fracaso escolar, absentismo escolar, reinserción educativa, educación inclusiva, educación alternativa.

Introduction

On average, 9.5 % of 18-24 year olds in the European Union (EU) left their education and training early in 2023, with more young men than women dropping out (11.3 % vs. 7.7 %). The countries with the lowest dropout rate were Croatia, Greece, Poland and Ireland (<5 %) while the highest dropout rate was recorded in Romania (16.6 %), followed by Spain (13.7 %), Germany (12.8 %) and Hungary (11.6 %). While there are still large differences between EU countries today, 16 EU countries have already achieved a school dropout rate of less than 9 %, thus meeting the EU target for 2030 (Eurostat, 2023, Ministry of Education and Vocational Training, 2023).

Several studies have shown that there are individual risk factors such as age, behavioral problems and low academic performance, and school-related factors such as student-teacher ratio, financial resources and the quality of school management that influence school absenteeism (Contreras-Villalobos et al., 2023; Espinoza et al., 2014). Not only do young people lose interest in attending school, but the system itself somehow ends up “expelling” them (Martínez-Valdivia and Burgos-Garca, 2020; Torkashvand et al., 2022). Pong and Ju (2000) found that the educational environment created by the family is also directly related to the educational outcomes of their children and their chances of remaining in the education system.

Within this complex, multifactorial framework, the main causes of early school leaving are associated with socioeconomic status, family background, the job search, ethnicity, family disintegration and families’ low expectations with regard to education (European Commission, 2022). Moreover, individuals that are left out of the education system can easily become excluded from social, cultural and economic dynamics. Recent research by Bernard and Michaud (2021) on school leaving reveals that many students

leave school because they feel that working is a much more attractive alternative. However, it is not easy for people without qualifications to gain access to jobs, which makes it important to receive training that offers support for the development of personal and professional projects. UNESCO (2024) estimates that the global cost of school leaving and lack of education amounts to 10 billion dollars a year. The message in this report is clear: education is a strategic investment, one of the best possible investments for individuals, economies and society as a whole.

So-called “Second Chance Schools¹” have been established as an effective response to school failure and early school leaving, as they provide a flexible, inclusive setting tailored to the needs of students who have had difficulties in the traditional education system. The attendees of these schools face various psychosocial difficulties, including situations such as living on the streets, drug use, social stigma, depression, domestic violence, labor exploitation, lack of participation in social and community organizations and vulnerability of their fundamental rights (Cimene et al., 2023, Know, 2020; Meryem et al., 2024). For this reason, the E2C pedagogical model is based on the development of competencies that facilitate job integration, which is experienced and reinforced during the educational process. The decision not to grant “permanent integration status” to young people responds precisely to their desire to “get to work” and gain access to paid employment, in which they can see their skills reflected and valued (Paniagua, 2022).

This approach breaks with traditional models that merely address the “professional situation” or the “discovery” of work environments. Instead, they accept that each young person’s autonomy depends largely on the connection between their capabilities and the resources made available to them both at work and in training. These schools create ties with local authorities, social services, associations and the private sector, the latter in particular with a view to offering possible training opportunities and jobs. It is an approach to teaching and counselling that focuses on the needs, desires and abilities of each student, where active learning is encouraged. The teaching modules are flexible, allowing for a combination of basic skills development (numeracy, literacy, social skills, etc.) and practical training at companies, and build-

¹ The term “E2O” will be used throughout the article when referring to the Spanish Network of Second Chance Schools, and “E2C” will be used for other networks.

ing skills through Information and Communication Technologies (European Commission, 2001; Soto et al., 2021). However, each country adapts these principles to its pedagogical model according to educational and social needs.

E2Cs are still a relatively limited initiative, so this exploratory scoping review (ESR) aims to provide insight into the topics of research on these schools as well as the characteristics and outcomes of their educational programs for the young people attending them. To date, no scoping reviews (SR) on E2Cs have been found, with the exception of two studies. The critical, non-systematic review by Barrientos (2022) seeks to discern the differences between alternative education and E2Cs: the former is associated with pedagogical methods like Montessori or Waldorf, while the latter is a component of alternative education designed for the inclusion of young people with needs that are not addressed in uniform school environments. The other study, the review by Paniagua (2022), focuses on second chance programs and briefly mentions the experiences of these schools: they are based on a model with certain shared common principles, such as comprehensive support for the individual and the adaptation of tailored paths that combine basic competencies with vocational training through work experience.

Method

SR is a research method that involves identifying and summarizing all the existing research available on a specific topic to provide a comprehensive overview, thus ensuring the transparency and replicability of the study. It offers a certain degree of cumulative knowledge about research —educational research, in this case— in which the SR and meta-analysis production is lower than in other disciplines (Philip, 2020). This ESR (exploratory scoping review) is useful for mapping the literature on emerging or evolving topics or for identifying gaps (Mak and Thomas, 2022). In this case, it is exploratory because it aims to provide a general overview of the schools.

Research question. The questions guiding this ESR are: What is the focus of E2C research? What kind of pedagogical model do these schools

and their programs follow? What educational outcomes are seen in the young people who attend these programs? The question was formulated in the PECO (Patient/Population, Exposure, Comparison, Outcomes) format because the primary research does not always have a control or comparison group (Sánchez-Martín et al., 2023).

Databases and descriptors. The ESR was conducted in four databases: three general databases (SCOPUS, Web of Science [WOS] and Dialnet), and one specific to the field of education (Education Resources Information Center [ERIC]). The combination of general databases follows the suggestions of Bramer et al. (2017), who consider this to be the best option for obtaining the highest rate of article retrieval. Google Scholar was not used because the findings of the study by Gusenbauer and Haddaway (2020) show that it does not guarantee the replicability of the ESR due to the natural growth of this database.

The descriptors used were “escuelas de segunda oportunidad”, “second chance program”, “second chance schools” and “écoles de la deuxième chance”, the search strings in WOS were (((((TI=“escuelas de segunda oportunidad”) OR AB=“escuelas de segunda oportunidad”) OR TI=“second chance program”) OR AB=“second chance program”) OR TI=“écoles de la deuxième chance”) OR AB=“écoles de la deuxième chance”) OR TI=“second chance schools”) OR AB=“second chance schools”, in SCOPUS (TITLE-ABS-KEY (“escuelas de segunda oportunidad”) OR TITLE-ABS-KEY (“second chance program”) OR TITLE-ABS-KEY (“écoles de la deuxième chance”) OR TITLE-ABS-KEY (“second chance schools”)) and in ERIC TITLE (“escuelas de segunda oportunidad”) OR ABSTRACT (“escuelas de segunda oportunidad”) OR TITLE (“second chance program”) OR ABSTRACT (“second chance program”) OR TITLE (“écoles de la deuxième chance”) OR ABSTRACT (“écoles de la deuxième chance”) OR TITLE (“second chance schools”) OR ABSTRACT (“second chance schools”).

Inclusion/exclusion criteria. The inclusion criteria included full-text documents written in English, French or Spanish and empirical studies in education published in research journals where E2C findings are presented. No time criterion was established, in order to identify as many documents as possible. The criterion established to assess the methodological quality of the

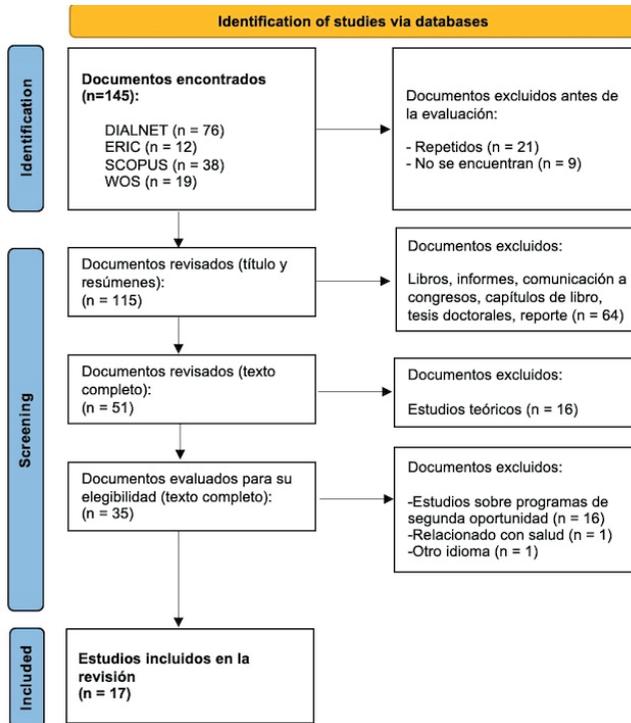
studies was that they should be published in academic databases. The exclusion criteria included studies written in languages other than those mentioned above and those not conducted on and in E2C, theoretical studies, systematic reviews and meta-analyses.

Extraction, analysis and synthesis of findings. The coding manual was prepared using features linked to the publication itself (authors, year of publication, title of the article, name of the journal, country and entities/universities where the research was carried out), the methodology (context, sample and method) and substance (aims and findings of the studies and programs). The researchers in this study screened the documents in order to reduce subjectivity (inter-observer agreement), thus complying with the recommendations made by Cooper et al. (2018). Each researcher assessed the title and abstract separately and then pooled the results. This same procedure was repeated for the full-text documents. Disagreements were discussed until 100% agreement was reached.

To analyze the general characteristics of the selected studies, frequencies and percentages were assessed in Microsoft Excel, and to identify the results of the schools and their programs, an inductive qualitative analysis was conducted manually (Bingham and Witkowsky, 2022). This type of analysis is an emergent strategy in which new codes or concepts emerge during the coding process. It is a “bottom-up” analytical strategy and therefore is not based on predetermined categories to be searched for in the text. Finally, the methodological quality of the primary research was assessed using three scales: COREQ (*Consolidated Criteria for Reporting Qualitative Research* by Tong et al. 2007), with 32 items for qualitative designs, RoB2 (Sterne et al., 2019), with five dimensions for quantitative designs, and GRAMMS (*Good Reporting of a Mixed Methods Study* by O’Cathain et al. 2008), with six questions for mixed designs.

Following three rounds of review, 17 of the 145 documents found met the inclusion criteria. The flow chart (Figure I) shows the reasons why 127 papers were excluded. Articles on “second chance programs” were also discarded if they were related to “compensatory programs” and thus were unrelated to the topic of interest.

FIGURE I. Flowchart



Source: Compiled by the authors

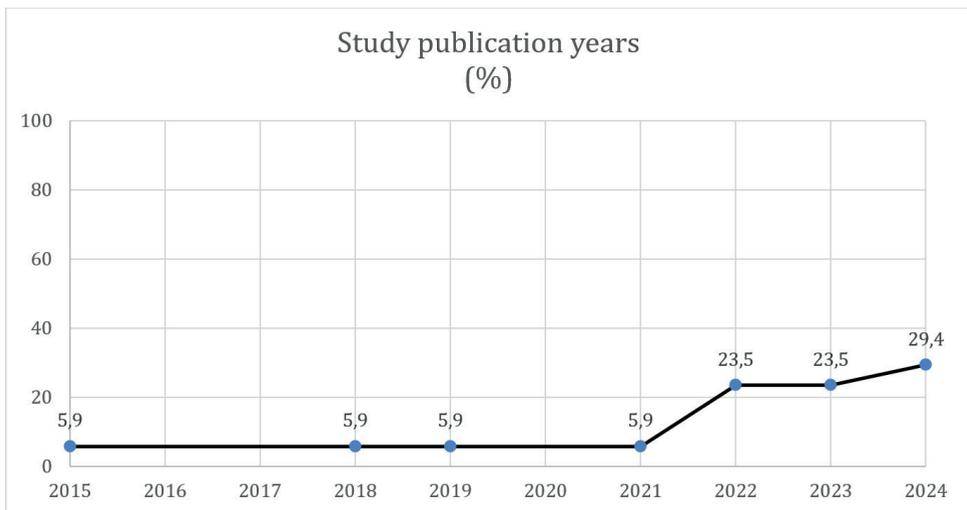
Findings

A general description is given below of the characteristics of the selected articles, outlining the profiles of the students at E2Cs, their programs and pedagogical methodologies, and the main findings in terms of the training of these youths. The bibliographic references of the 17 papers included can be found in Appendix 2.

General features of the studies

The 17 documents included were published between 2015 and 2024. An increase is seen in the number of publications from 2022 onwards, after which time 76.5% of the studies were conducted. The highest numbers of publications are from 2022, 2023 and 2024 (23.5% and 29.4%, respectively) (Graph I).

GRAPH I. Years of publication of the studies found



Source: Compiled by the authors

58.8% of the articles are written in English and 41.2% in Spanish. 77.2% were published in Europe. Almost half of the authors are from Spain (47.6%), 19% are from Chile, 9.5% from Belgium and 4.8% from Greece, France, the United States, Portugal and Slovakia, respectively. All the studies were conducted at universities, and the largest body of research was published by the University of Valencia (Spain) (70%), which boasts a consolidated E2C research group. 70.6% of the articles were published in journals specializing in Education and the remaining 29.4%, in Social Sciences journals.

In terms of the aims of the studies, one group of papers focuses on

competency development (Houot and Lavielle-Gutnik, 2023) and career paths (Merino et al., 2022), creative writing (Kalouptsi, 2022), career orientation (Moreno-Morilla and Romero-Rodríguez, 2024), and personal, vocational and professional guidance (Chisvert-Tarazona et al. 2024), expectations about school (Espinoza et al., 2016) and the future (Palomares-Montero et al., 2024), educational re-engagement (Espinoza et al., 2020, García-Rubio, 2023) and strategies to combat school leaving (Prieto, 2015). Other studies discuss the organizational structure of the schools (Martínez-Morales et al., 2024) and their curriculum (Tárraga- Mínguez, et al., 2022), the experience of the Valdocco workshop-school (Báez Garrido et al., 2006), the perceptions of students, teachers and school leaders (Espinoza et al., 2019) in relation to the determining factors of success or failure of the programs (Pasternáková et al., 2023), the professional identity of schools' teachers (Madero Cabib and Mingo Rojas, 2024) and a comparative study between Spain and Portugal (Macedo and García-Rubio, 2022).

Seven of the 17 studies are qualitative, and data analysis and research reporting are the methodological aspects with the highest number of positive ratings; four are quantitative, all with a low risk of bias; and three are mixed, and it is not always clear how, at what stage and why the quantitative and qualitative data have been combined. Only three studies were left out of the methodological quality assessment, because they were educational experiences (Appendix 1). Table I summarizes the general characteristics of these studies.

TABLE I. Summary of the studies included

Authors and year	Aims	Context, sample and methodological design	Place
Báez Garrido et al. (2006)	Occupational vocational training in diverse trades with a comprehensive approach spanning several areas of intervention	Valdocco School-Workshop Experience Ages 16-22. Program=psychosocial guidance, family and social and community intervention, socio-cultural animation, physical development and sports, complementary activities and instrumental training	Spain
Chisvert-Tarazona et al. (2024)	Personal, vocational and professional guidance in E2O, analyzing guidance models and processes for transitional training mechanisms for young people in vulnerable situations	Mixed study Semi-structured interviews= 24 principals/directors of studies in E2O, 9 teachers/counselors in secondary schools and 10 company mentors Survey= 351 E2O graduates Evaluation of school activity indicators = 1592 E2O graduates	Spain
Espinoza et al. (2019)	To understand the perceptions that students, teachers and directors have regarding aspects that might influence success or failure in the retention of adolescents involved in educational experiences referred to as “E2C” in Chile	Qualitative study 19 years old 56 students Semi-structured interviews=56 (5 students, one teacher and one representative of the management team from each of the eight integrated youth and adult education centers in the Metropolitan Region)	Chile
Espinoza et al. (2018)	To analyze the perceptions of young people who dropped out of traditional school and enrolled at “second chance” institutions about their expectations for schooling	Qualitative-descriptive study Ages 14-18 40 students Semi-structured interviews=40 semi-structured interviews with adolescents at E2Cs (5 students from each of the Integrated Youth and Adult Education Centers in the 8 selected municipalities of the Metropolitan Region)	Chile

Espinoza et al. (2020)	To identify activities that enable young people who do not attend school to enroll in so-called “remedial” schools currently operating in Chile in order to become re-engaged	Quantitative survey-based study Ages 14-18 2,199 students Latent class analysis to classify students into four different groups	Chile
García-Rubio (2023)	Educational re-engagement of young people at risk of exclusion at E2Cs in Portugal	Qualitative study Ages 15-25 Semi-structured interviews= 6 E2C leaders Focus group= members of the schools	Portugal
Houot and Lavielle-Gutnik (2023)	Co-construction of a competency benchmark in E2O for unqualified young people	Educational experience Ages 16-22 10 schools, interviews (N= 40) and 9 focus groups (N= 6) Regional seminars= between 60 and 170 E2C professionals Analysis of 400 surveys	France
Kalouptsi (2022)	Creative writing at Diavata Correctional Facility in Greece	Educational experience - creative writing Adults from 30-35 years old and one 50 year-old Five participants=two Albanians, two Greek Roma and one Kurd Creative writing activity at a correctional facility	Greece
Macedo and García-Rubio (2022)	E2O in Spain and Portugal, analyzing the needs of young people and the training proposals offered in the two countries	Qualitative study Youths aged 15-29 from Spain Youths aged 15 and 25 years old from Portugal. Semi-structured interviews=10 E2O leaders in Spain and 6 E2C leaders in Portugal Discussion group= Portuguese E2C leaders	Spain and Portugal
Madero Cabib and Mingo Rojas (2024)	To qualitatively explore the professional teaching identity of teachers working in second chance schools in Santiago de Chile, where children and young people resume their interrupted educational paths	Qualitative-exploratory study 12 teachers Semi-structured interviews Focus groups: different members of the educational communities (students, family, professionals and leadership team)	Chile

Martínez-Morales et al. (2024)	To identify the organizational dimensions of accredited E2Os in Spain and to assess the extent to which these organizations promote the social inclusion of their students	Mixed study Ages 15-29 Semi-structured interviews=24 interviews (16 individual and 8 joint interviews) with members of E2O leadership teams, in which 32 leaders participated Survey= 351 young people	Spain
Merino et al. (2022)	Effect of E2O training on the competency and employment paths of vulnerable young people.	Quantitative-descriptive study Ages 15-29 1,592 young people Analysis of descriptive techniques and multiple regression and multinomial logarithmic regression models	Spain
Moreno-Morilla and Romero-Rodríguez (2024)	Successful tools used in career development guidance processes with at-risk youths, especially those with socio-cultural vulnerability	Qualitative study - case study - research -action - qualitative career assessment 26 year-old= case study (case chosen from a group of 22 young people at E2Os) Collaborative ethnographic research	Spain
Palomares-Montero et al. (2024)	Analysis of the profile, ties and future expectations of E2O students	Quantitative survey-based study Ages 15-30 1,119 young people Content validation, descriptive and bivariate analysis and logarithmic regression models	Spain
Pasternáková et al. (2023)	Determining factors of success or failure of second chance programs in education, from the teachers' perspective	Quantitative study-instrument validation Ages 18-24 1,038 teachers (56.45% female and 43.55% male) Creation of a survey about second chance education indicators =26 questions (Likert scale) Factor analysis	Slovakia
Prieto (2015)	Role of E2Os in the strategy to combat early school leaving, focusing on the path from school vulnerability to educational disengagement	Qualitative study-case study Ages 14-25 In-depth interviews=10 young people + teaching staff and educational leaders Focus group=school coordinators, faculty and administrative staff	Spain

Tárraga-Mínguez et al. (2022)	E2O and its curricular proposal for the personal reconstruction, return to education and job placement of young people at risk of exclusion	Mixed study Ages 20-24 Semi-structured interviews=24 interviews with E2O principals and/or directors of studies, 10 supervisors and/or company managers, 9 teachers and counsellors who tutor the young people Survey= 351 young people	Spain
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Source: the authors

Note: In Spain, these schools are referred to as E2O

Profiles of students at E2Cs

The students that attend E2Cs have a profile with common features across different contexts and countries. In socioeconomic and family-related terms, the students tend to come from vulnerable and dysfunctional backgrounds, with situations of abuse, domestic violence and conditions of poverty. In Chile, Espinoza et al. (2019) and Madero Cabib and Mingo Rojas (2024) highlight the high degree of vulnerability of these young people, who tend to fall behind in school and experience precarious living conditions. In Spain, Martínez-Morales et al. (2024) and Merino et al. (2022) also mention the complexity of the family situations of these students, most of which come from households with financial difficulties.

In terms of age, the majority of E2C participants are young people who have dropped out of the traditional education system. In France, for example, Houot and Lavielle-Gutnik (2023) indicate that the students are between 16 and 22 years old, while in Chile, Espinoza et al. (2019) report an age range of 15 to 18 years old, and in Slovakia, Pasternáková et al. (2023) report an age range of 18 to 24 years old. In terms of gender, there is a greater prevalence of male students. In Spain, males account for 69.57% and 67.79% according to Martínez-Morales et al. (2024) and Merino et al. (2022), respectively.

In relation to previous educational experiences, E2C students often have a history of school failure and lack of motivation. In Chile, Espinoza et al. (2019) mention discouragement and low academic performance, leading to school repetition. Similarly, in Spain, Merino et al. (2022) indicate that many students have low academic levels when they enroll in E2C, with 46% in the 2nd year of Compulsory Secondary Education (ESO). In other

countries, such as Greece, it has also been observed that the students come from low socioeconomic settings and have limited educational backgrounds (Kalouptsi, 2022).

E2C students often face situations of vulnerability and risk, such as behavioral problems, disabilities, addictions and criminal conduct. In Chile, many young people have been referred to detention centers or to the National Service for Minors due to family issues or drug use (Espinoza et al., 2019). In Portugal, García-Rubio (2023) highlights disinterest in school stemming from negative experiences and complex personal circumstances.

Finally, E2Cs serve a diverse population in terms of nationality and ethnicity. In Spain, Martínez-Morales et al. (2024) report that most of the students are born in Spain, but a significant percentage come from other Spanish- or non-Spanish-speaking countries.

E2C programs

E2Cs implement diverse educational interventions tailored to the needs of the students, focused on providing skills and competencies for the job market. The most common types of intervention include vocational and occupational training, encompassing trades such as masonry, carpentry, electricity, painting and welding, accompanied by social and personal skills (Báez Garrido et al., 2006). In Chile, E2Cs offer job workshops and recreational activities (Espinoza et al., 2019), while in Slovakia, the development of professional skills and communication and leadership competencies is highlighted (Pasternáková et al., 2023). Likewise, E2Cs focus on obtaining educational certification, such as the Compulsory Secondary Education Diploma in Spain or access to Vocational Training, and on certification and assessment programs aimed at helping the young people obtain competencies sought after in the job market (García-Rubio, 2023; Houot and Lavielle-Gutnik, 2023; Merino et al., 2022). Psychosocial intervention is also essential, providing tailored follow-ups and job orientation (Báez Garrido et al., 2006). Similarly, support for students with family or behavioral problems is also highlighted (Espinoza et al., 2019). Family involvement is another key aspect, through programs that foster collaboration and the creation of bonds of trust between young

people and professionals (García-Rubio, 2023). Another important aspect is participation in the labor intermediation process, through dual vocational training programs (Pasternáková et al., 2023), which combine theory and practice. E2Cs also promote social inclusion and social skills development, acting as a bridge toward education and social inclusion, especially for students from vulnerable backgrounds (Pasternáková et al., 2023). E2Cs feature tailored training paths adapted to the individual needs of the students through diagnostic assessments and a flexible approach (García-Rubio, 2023; Moreno-Morilla and Romero-Rodríguez, 2024). Through ongoing, non-punitive assessments focused on the learning process, the training paths can be adjusted to match the students' progress and needs (Merino et al., 2022). Moreover, there is constant collaboration with multidisciplinary services, which favors comprehensive support in line with each young person's needs (Pasternáková et al., 2023).

Pedagogical methodologies developed at E2Cs

E2Cs implement a range of methodologies adapted to the needs of students from vulnerable backgrounds who have had poor experiences in the traditional education system. One of the main methodologies is active, participatory learning, which promotes student interaction and involvement, making learning more relevant (Pasternáková et al., 2023). They also implement project-based work, which allows students to apply their knowledge in practical situations and choose their own training paths (García-Rubio, 2023). In addition, E2Cs personalize the teaching to meet the individual needs of each student, adapting curricula to their progress and difficulties, and using individualized tutoring to offer tailored support (Báez Garrido et al., 2006).

Another key methodology is practice-based learning, which facilitates the acquisition of competencies through real-life experiences, integrating theory and practice (Houot and Lavielle-Gutnik, 2023). Dual vocational education and training (VET), which combines both approaches, prepares students for the job market (Pasternáková et al., 2023). In terms of assessment, E2Cs use ongoing, non-punitive assessments focused on the learning process, as well as self-assessment and constant feedback to foster personal development

(Merino et al., 2022; Moreno-Morilla and Romero-Rodríguez, 2024). They provide psychosocial and emotional support through individualized guidance and follow-up to overcome personal and educational difficulties (Báez Garrido et al., 2006). They offer non-academic activities such as sports and art, which contribute to the development of social and emotional skills (Espinoza et al., 2019). Appendix 3 shows a table of factors that contribute to the success and failure of E2Cs, providing a clear picture of the elements that must be considered to improve the effectiveness of these programs.

E2C outcomes

E2Cs play a crucial role in the educational and social reintegration of young people who have dropped out of the formal education system because they contribute to the acquisition of personal, economic, training and vocational functions and have an impact on the competency development of their participants.

The categories in Table II on E2C outcomes were selected based on a qualitative analysis of the studies included in the ESR. These categories reflect the various areas in which E2Cs are present in the lives of young people, encompassing aspects of training, certification, professionalization, personal development, educational and workplace reintegration, socialization, support for the public, emotional aspects, employability, financial aspects, comprehensive guidance, self-knowledge, healthy habits, critical thinking and commitment to their future and education. These categories were selected by identifying the main findings and competencies developed by the students, as reported in the studies analyzed.

TABLE II. E2C outcomes by categories

Categories	
Training function or competency	<ul style="list-style-type: none"> - Re-entry and further training - Staying in the education system - Reducing absenteeism and dropout rates - Reaching a specific achievement - Improving basic skills - Reintegration into the education system - Gateway to secondary school
Certification/proof function or competency	<ul style="list-style-type: none"> - Obtaining secondary education certification or educational credentials - Adding to one's Curriculum Vitae
Professionalization function or competency (preparation for adult life)	<ul style="list-style-type: none"> - Development of activities complementary to traditional classroom activities - Promotion and acquisition of professional skills and competencies - Responding to diversity and specific needs of students - Internships in the workplace - Transition to the world of work - Improving employment opportunities - Continuous professional development
Personal development and self-knowledge function or competency (Flexibility, adaptability)	<ul style="list-style-type: none"> - Personalization of training paths - Comprehensive care - Promoting self-knowledge - Flexibility in the training offered - Development of cross-cutting competencies: responsibility, proactivity, teamwork, autonomy and self-confidence - Reconstruction of educational and personal identity
Return to education system and/or job placement function	<ul style="list-style-type: none"> - Re-entry into the formal education system or insertion in the job market - Building sustainable life and career paths - Educational, social and occupational inclusion - Creating emotional ties with students and adapting educational programs to their specific needs - Integration into society and the job market
Socialization function or competency	<ul style="list-style-type: none"> - Contributing to the development of norms and values - Identifying social functioning - Tool to combat social and labor exclusion - Development of communication and language skills - Improving social relations

<p>Support function or civic competency</p>	<ul style="list-style-type: none"> - Developing skills to achieve integration into society and avoid discrimination - Help with reducing skills gaps and the ensuing economic and social inequality - Developing support networks both within and outside the educational environment - Acquiring a critical awareness of their setting and the opportunities for intervention therein, in order to transform it - Adapting to the environment - Strengthening community support
<p>Emotional, psychological, or subsequent mentoring function or competency (creation of support networks)</p>	<ul style="list-style-type: none"> - Emotional mentoring - Emotional bond - Emotional restraint - Positive learning environment - Socio-emotional development
<p>Employability</p>	<ul style="list-style-type: none"> - Preparation and entry into the job market - Boosting job opportunities - Improving long-term employment outlook - Acquiring professional and socio-educational competencies - Tailored practical programs - Access to qualified jobs
<p>Economic function</p>	<ul style="list-style-type: none"> - Education focused on the economic dimension - Help with overcoming the economic gap - Improving economic prospects
<p>Comprehensive development or guidance</p>	<ul style="list-style-type: none"> - Comprehensive process encompassing personal, vocational and professional issues - Development of cross-cutting competencies - Tailored, holistic approach
<p>Self-knowledge competency</p>	<ul style="list-style-type: none"> - Decision-making preparedness - Sense of control and responsibility - Active participation in education - Capacity to adapt to diverse situations
<p>Healthy habits</p>	<ul style="list-style-type: none"> - Acquiring healthy lifestyle habits - Participating in sports and leisure activities - Physical development
<p>Critical thinking</p>	<ul style="list-style-type: none"> - Development of critical and community thinking - Understanding the context - Identifying ways of intervening and contextual transformation

<p>Commitment to their future and education</p>	<ul style="list-style-type: none"> - Attitude of commitment toward the future - Developing skills and competencies for building a fair, more promising future - Improving the level of commitment to education - Educational and job-related expectations for the future - Motivation for continuing education
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Source: Compiled by the authors

E2Cs help their students acquire certain competencies and skills, making a significant positive impact on their lives, especially for those who have experienced school failure and social exclusion. These schools contribute to the youths' development, addressing several key competencies. According to Palomares-Montero et al. (2024), 36.2% of the students significantly improve their basic skills, which allows them to progress in their education and increase their motivation to continue in the education system, thus facilitating school reintegration (Merino et al., 2022). They also provide certifications that are essential to enhance the students' curriculum vitae and facilitate their access to the formal job market (Espinoza et al., 2018; Houot and Lavielle-Gutnik, 2023). E2Cs offer vocational training, preparing them for adult life through practical skills-building and internships at companies (Chisvert-Tarazona et al., 2024), which improves their professional skills (Palomares-Montero et al., 2024). These institutions also foster personal development and self-knowledge, providing flexible and personalized education that helps students boost their self-esteem and confidence (García-Rubio, 2023; Martínez-Morales et al., 2024) (Table II).

E2Cs facilitate the reintegration of young people into the education system or entry in the workplace, helping them to overcome absenteeism and improving their preparedness for the job market (Macedo and García-Rubio, 2022). They also contribute to the development of social skills and values, combating social exclusion and promoting the integration of young people into society (Pasternáková et al., 2023). In addition, these schools foster civic participation and critical reflection, which helps the youths to improve their surroundings and reduce economic and social inequality (Espinoza et al., 2018; Moreno-Morilla and Romero-Rodríguez, 2024). In this regard, they offer an emotionally supportive environment, contributing to the socio-emo-

tional development of the students and ensuring their successful integration into the job market or the education system (Chisvert-Tarazona et al., 2024; Pasternáková et al., 2023). In terms of employability, E2Cs increase the young people's job opportunities through the training received, job matching services and workplace internships (Pasternáková et al., 2023).

The certification earned at E2Cs is also crucial for access to formal jobs and improving living conditions (Espinoza et al., 2018). The programs promote overall student development, helping them to build a sustainable and fulfilling career (Moreno-Morilla and Romero-Rodríguez, 2024). Self-knowledge competency is a prominent area, given that E2Cs motivate students to make active decisions about their future and empower them to better adapt to diverse situations (Moreno-Morilla and Romero-Rodríguez, 2024). In terms of healthy habits, students improve their knowledge about health through leisure and sports activities (Báez Garrido et al., 2006; Merino et al., 2022). E2Cs also foster critical thinking and a commitment to the youths' educational future, helping them to transform their surroundings and develop a greater sense of hope and responsibility for their lives (Espinoza et al., 2020; Moreno-Morilla and Romero-Rodríguez, 2024). In conclusion, E2Cs play a key role in the development of these youths' academic, professional and personal competencies, offering them a second chance to build a more promising future.

Discussion and conclusions

E2Cs directly influence students' lives, improving their personal and emotional development, helping them acquire skills and competencies, facilitating their inclusion in society and the workplace, promoting a return to education and fostering their active participation and empowerment. The references to the articles and authors mentioned above highlight the importance of a comprehensive, tailored approach that contributes to the success of these schools.

E2Cs not only have a positive and transformative impact on the young people, but they also afford a second chance to improve their education, personal development, employability and social integration. These programs are

essential in helping young people overcome early school leaving and build a more promising future (European Commission, 2001; Eurostat, 2023; Soto et al., 2021).

While E2C students have a profile that commonly features socioeconomic vulnerability, prior educational difficulties, and in many cases, experiences of social and family exclusion, the interventions at these schools are geared towards providing them with a second chance to reintegrate into the education system and improve their employment and social prospects (Cimene et al., 2023, Know, 2020; Meryem et al. 2024).

In addition, E2Cs seek to tailor the students' training paths through diagnostic assessments, continuous monitoring and the use of narrative tools that facilitate reflection on their own pasts and aspirations. Through continuous assessment and tailored mentoring, the training process can be adapted to match the progress and needs of each young person. This curricular flexibility, together with the collaboration with multidisciplinary services, ensures that each young person receives adequate support for their overall development, and these findings are also shown in the review conducted by Paniagua (2022).

E2Cs apply a variety of pedagogical approaches that promote active participation, tailored learning, integration of theory and practice and the development of socio-emotional skills, in order to offer students a true opportunity to reintegrate into the education and employment system.

In terms of the competencies they help the young people develop, the findings confirm that these schools have an impact not only when it comes to improving academic performance, but also with regard to the youths' social, emotional and professional skills. E2Cs are designed to provide training that combines academic knowledge with practical vocational skills. The young people attending these schools typically have the opportunity to develop key competencies in both academic and professional fields, such as problem solving, critical thinking, time management, and technical and job skills (Bitsakos, 2021; Van Den Berghe et al., 2024).

The study by Gueta and Berkovich (2022) also confirms the findings of this review. E2Cs focus on the development of social and emotional skills, which are essential for the social and professional integration of young peo-

ple. Students who have been exposed to complex family and social circumstances often benefit from this more comprehensive approach. Autonomy in learning and social and professional empowerment such as agency, trust and control over one's professional and personal future are positive findings that have been addressed in the research analyzed.

However, it is also true that the few meta-analyses found that examine educational initiatives similar to E2C report both positive and negative findings. Paniagua (2022) offers a possible explanation for these differences: the pedagogical model of the schools works, but the methodological quality of the primary research from which the evidence is drawn is lacking.

In conclusion, this exploratory scoping review has made it possible to objectively assess the effectiveness of E2Cs by compiling and analyzing prior research, identifying whether these schools are actually fulfilling their purpose and pinpointing factors that contribute to their success or failure. The evidence shows that best practices and successful methodologies can be identified. Thus, evidence-based adjustments can be rendered in education policy and E2C leadership, which will improve the quality and impact of the programs offered. The study has aided in consolidating and disseminating knowledge on how E2Cs work. This type of review is not limited to mere data compilation, but also helps to integrate different perspectives and approaches that may have been overlooked in separate studies. The findings presented here enrich the overall understanding of the E2C pedagogical model.

However, the results obtained must be treated with a degree of caution. The number of papers that met the inclusion criteria is limited, and the methodological quality is not always rigorous. An effort was made to compensate for this limitation through a detailed analysis of each study, so that itemized information is offered on the programs and their effects. The scarcity of meta-analyses on educational reintegration programs shows the need for an increase in primary research with methodological quality.

Implications for public policy in education

- Non-formal education programs can play a crucial role when it comes to providing a second chance at education for children and youths that do not attend school, thus expanding the educational opportunities to include programs that are out of reach in the traditional public school system. However,

these educational opportunities must provide a recognized path toward the formal education system.

- States need “second chance” systems and programs that re-engage and re-direct young people who drop out of the public school system. Although the body of research on the effectiveness of such programs is rather limited, most of the findings are positive. The individual and societal cost of neglecting this problem is potentially enormous for countries.
- There is a need to further consolidate the ties between universities and E2Cs through innovation and research projects: universities could provide support in the evaluation of the E2C model while the schools could contribute their professional experience of working with disadvantaged, unqualified, unemployed youths at risk of social exclusion.
- Educational disadvantage stems not only from a lack of financial resources. It can also be the result of a lack of “useful” socio-cultural resources, as well as inequalities associated with marginal social status. In order to understand educational disadvantage, it is therefore necessary to analyze both the social status of individuals and the social arrangements of society.
- The opportunities offered should not be limited to providing equality. The means for achieving goals (resources) differ from the freedom to achieve goals (capability); the latter affords genuine opportunities to be and do what the individual values. Policy provisions should be assessed not only in terms of the resources that are allocated to address unfair inequalities, but also in terms of the extent to which the opportunities are adequate, relevant and convertible.
- Differences in educational outcomes alone do not provide a full picture. It is important to bear in mind the opportunities these young people have received, as well as the factors that may have prevented them from taking advantage of those opportunities and turning them into meaningful achievements.

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Appendixes

Appendix 1. Assessment of the methodological quality of the primary research

COREQ (Consolidated Criteria for Reporting Qualitative Research)

P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15	P16	P17	P18	P19	P20	P21	P22	P23	P24	P25	P26	P27	P28	P29	P30	P31	P32
Espinoza et al. (2019)																															
no	no	no	no	si	no	no	no	si	no	si	no	no	no	si	si	no	si	no	no	no	no	no	no	no	si	si	no	si	si	si	si
Espinoza et al. (2018)																															
no	no	no	no	no	no	no	si	no	no	si	no	no	no	si	no	no	si	no	no	no	no	no	no	no	si	si	no	si	si	si	si
García-Rubio (2023)																															
si	si	si	si	no	no	no	no	si	no	si	no	si	no	si	no	no	si	no	no	no	no	no	no	no	si	si	si	si	si	si	si
Macedo y García-Rubio (2022)																															
no	no	no	no	no	no	no	no	si	no	si	no	si	no	si	no	no	si	no	no	no	no	no	no	no	si	si	no	si	si	si	si
Madero Cabib y Mingo Rojas (2024)																															
no	no	no	no	no	si	no	no	si	si	si	si	no	no	no	si	no	no	si	no	si	no	no	si	no	si	si	no	si	si	si	si
Moreno-Morilla y Romero-Rodríguez (2024)																															
no	no	no	no	no	no	no	si	si	no	si	no	no	no	si	no	si	si	si	si	no	no	si	no	no	si	no	si	si	si	si	si
Prieto (2015)																															
no	no	no	si	no	no	no	si	no	no	si	no	no	no	si	no	no	no	no	no	no	no	no	no	no	si	no	no	si	si	si	si

Legenda= P=pregunta; Si=si incluye información, NO=no incluye información

RoB 2 (tool for assessing risk of bias in randomised trials)			GRAMMS (Good Reporting of a Mixed Methods Study)						
Study ID	Overall		Artículo	P1	P2	P3	P4	P5	P6
Espinoza et al. (2020)	+	Low risk	Chisvert-Tarazona et al. (2024)	Si	Si	Si	Si	No	No
Merino et al. (2022)	+	Some concerns	Martínez-Morales et al. (2024)	No	No suficiente información	Si	No	No	No
Palomares et al. (2024)	-	High risk	Tárraga-Minguez et al. (2022)	No	No	Si	No	Si, mejorable	No
Pasternáková et al. (2023)	+		Legenda= P=pregunta; Si; Si, pero podría mejorarse de ser posible; No; No hay suficiente información; No aplica						

Appendix 2. List of references of the 17 documents that met the inclusion criteria.

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Appendix 3. Related factors that contribute to the success and failure of E2Cs

Factors linked to success	Factors linked to failure
Personalization of training paths	Lack of financial and material resources
Adapting to the students' individual needs	Discouragement and prior low academic performance
Ongoing, non-punitive assessment	Behavioral problems and criminal conduct
Psychosocial and emotional support	Dysfunctional family backgrounds
Collaboration with multidisciplinary services	Lack of follow-up and job orientation
Dual vocational education and training (VET)	Disinterest in school stemming from negative experiences
Active participation and practice-based learning	Social stigmatization and exclusion
Family involvement	Addiction issues
Development of social and emotional skills	Lack of integration in the traditional education system
Educational certification and job preparedness	Lack of job opportunities

To derive or to drift? Youth in transition between secondary education institutes and second chance schools¹

¿Derivar o ir a la deriva? Jóvenes en transición entre institutos de educación secundaria y escuelas de segunda oportunidad

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Abstract

Reducing the rate of early school leaving continues to be a priority for educational systems. This article involves an analysis of the transition of young people after their failure in the formal education system towards second-chance schools (SCE), how their profiles are constructed, how educational trajectories are determined, and the role of educational agents involved in these processes in the Spanish context. The aim of this work is to understand how transitions between these educational institutions and their underlying logic are articulated, as well as the coordination and supposed bidirectionality in students' trajectories. The methodology is based on a qualitative approach and the triangulation of agents and instruments. Twenty-four semistructured interviews were conducted with SCE management officials, and nine interviews were conducted with tutors or counsellors at secondary education institutions (SEIs). Six discussion groups were subsequently held with 47 educators and six discussion groups with 56 young people from 24 SCEs. The results indicate that these young people hold different perspectives from those of educational agents. SEI teachers focus to a greater extent on individual factors, such as demotivation, ruptures, and conflict, whereas SCE professionals have a more holistic and comprehensive view of young people, incorporating reflections on their social and contextual conditions. Notably, the logic of coordination between institutions does not always prevail. Young people and their families rarely participate in decision-making regarding their own trajectories upon their premature departure from an SEI. In some cases, referral and externalization are imposed in the SEI. Finally, some unintended effects of educational policies are identified, as well as some divergences in their application at the regional level, which provide elements for reflection.

Keywords: Dropout, unqualified young people, secondary education, educational transitions, Second Chance Schools.

Resumen

Reducir la tasa de abandono escolar temprano continúa siendo una prioridad para los sistemas educativos. Este artículo analiza la transición de jóvenes tras su fracaso en el sistema educativo formal hacia las escuelas de segunda oportunidad (E2O), cómo se construyen sus perfiles, cómo se deciden las trayectorias educativas y el papel de los agentes educativos que intervienen en estos procesos en el contexto español. El objetivo del trabajo es comprender cómo se articulan las transiciones entre estas instituciones educativas y sus lógicas subyacentes, así como la coordinación y supuesta bidireccionalidad en sus trayecto-

rias. La metodología parte de una aproximación cualitativa y la triangulación de agentes e instrumentos. Se han realizado 24 entrevistas semiestructuradas a responsables de dirección de las E2O y 9 entrevistas a tutores u orientadores de institutos de educación secundaria (IES). Con posterioridad se realizaron 6 grupos de discusión en los que han participado 47 educadores y 6 grupos de discusión que contaron con 56 jóvenes, de 24 E2O. Los resultados apuntan diferentes miradas de los agentes educativos al analizar el perfil de estos jóvenes. El profesorado de IES focaliza en mayor grado en factores individuales: la desmotivación, las rupturas y el conflicto; mientras que los profesionales de E2O tienen una visión más holística e integral del joven, incorporando reflexiones sobre su estigmatización. Se constata que no siempre prevalece una lógica de coordinación entre instituciones. Los jóvenes y sus familias apenas participan en la toma de decisiones de sus propias trayectorias a su salida prematura del IES. De hecho, en algunos casos se impone en los IES la derivación y externalización. Por último, se identifican algunos efectos no deseados de las políticas educativas y algunas divergencias en la aplicación de estas a nivel autonómico que aportan elementos para la reflexión.

Palabras clave: Abandono de estudios, jóvenes sin cualificación, enseñanza secundaria, transiciones educativas, Escuelas de Segunda Oportunidad.

Introduction

The current education system expands entry and exit points, making access to training more flexible to compensate for inequalities on the basis of socio-economic origin. Along these lines, the European Strategy attributes relevant roles in smoothing educational transitions, reducing early school leaving, and meeting the needs of a knowledge-based economy to education, vocational training, and guidance (European Commission et al., 2014).

In 2023, 13.6% of students left school early (INE, 2024). Although this rate has decreased significantly in the last decade, it is still far from the 9% proposed by the European Union in the Europe 2030 Strategy. It is a prolonged process, the result of a trajectory of disconnection and educational failure that, in many cases, begins in early childhood (Dupéré et al., 2015; Samuel & Burguer, 2020).

Solís and Blanco (2014) introduce two features of educational progression to explain social stratification. On the one hand, vertical stratifica-

tion refers to school continuity or disenrolment during the transition between educational levels. On the other hand, horizontal stratification refers to selection processes that generate inequality when placed in different educational modalities and institutions. These training pathways are designed to externalize academic failure (Rujas, 2020).

Additionally, *push* and *pull factors* determine early school leaving (Nes et al., 2017; NESSE, 2009). *Push* factors push students to abandon the educational system through educational exclusion and school segregation (Tarabini, 2016), aggravated by unfavourable socioeconomic conditions or low academic performance. *Pull factors* attract students to work or training alternatives outside the formal education system.

European youth at risk of vulnerability accumulate negative experiences in the educational system and typically have limited access to economic, cultural, and social capital (Scandurra et al., 2020). However, these inequalities do not stem exclusively from limited resources. Transitions are inherent in educational policies (Rawolle & Lingard, 2008) and articulate unequal meanings and opportunities beyond the dominant discourses of choice and individualization (Cuconato & Walther, 2015). Both institutional structures and individual biographical orientations affect educational trajectories (Walther et al., 2015), leading to early externalization on the part of students. Young people who recompose their identity consider transition a reasonable option and even an individual choice (Rujas, 2020).

From an interactionist perspective, the choice is the result of complex negotiations between young people and other referents, especially families and teachers, generating different levels of action and creating meaning (Cuconato & Walther, 2015). The complexity of these processes creates uncertainties and requires good coordination among centres, teachers and families, as well as a school culture that is attentive to their needs. Identifying, analysing, questioning and coconstructing alternatives to segregation is a collective task (Collet et al., 2022).

Walther et al. (2015) identify five trajectory patterns, i.e., configurations of structure and agency, in youth educational transitions. Two are clearly linked to these groups: (1) *the discontinuous career path* includes young people who do not enter vocational education and training of their own choosing

and/or do so after interruptions; and (2) *the remedial or intermediate path* refers to young people who enter compensatory intermediate courses parallel to formal training as a result of poor performance in compulsory secondary education.

The welfare state is based on a firm belief in universal education and its ability to reduce and/or eliminate social inequalities (Barr, 2020). However, the conditionality of the social rights of young people at risk of social exclusion is evidenced by the state's favouring of an activation approach to study and work that amplifies individual responsibility and reduces state and political responsibility (Morel et al., 2013).

Reforms highlight policies that seek to reverse early school leaving and address transitions to work or other training, not at the time students are leaving the system but before they complete their schooling (Morentin & Ballesteros, 2024). It is important not to limit the study of transitions to formal educational stages, given that less formalized contexts can be key to educational re-engagement and labour market integration. An example is the second-chance school (SCE), which offers an educational outlet to those who drop out of the educational system, enabling school continuity and reducing the risk for these young people, who begin to consider options for educational re-engagement and labour market integration (Marhuenda-Fluixá & Chisvert-Tarazona, 2022; Palomares-Montero et al., 2024).

SCEs, promoted by third-sector entities, are foundations, associations, cooperatives, or platforms. They are characterized by pedagogical flexibility, adapting their methodology to serve young people at risk of exclusion, and offering personalized training paths that combine academic training with job skills. In contrast, secondary education institutions (SEIs) are regulated by Organic Law 3/2020 on Education, which requires a more rigid and standardized curriculum. Although the regulated education system promotes equity and inclusion, its traditional structure may not be suitable for students who have dropped out of school (Palomares-Montero et al., 2024).

The Spanish SCE Association² has accredited 47 SCEs, which serve approximately 8,000 students annually and play a crucial role in the educational reintegration of young people who have dropped out of the education

2 <https://www.e2oespana.org/>

system. The 6-month success rate of students after leaving SCEs (entering the labour market or formal or informal training at another institution) was 63% in 2023 (Spanish SCE Association, 2024). This paper focuses on the role played by SCEs. It analyses the two-way transitions between SEIs in relation to SCEs in Spain. Table I presents the specific objectives and initial assumptions.

Table I. Specific objectives and initial assumptions

Specific objective	Initial assumptions
1. Analyse the profiles of young people who move between SEIs and SCEs from the perspective of educational agents.	1.1. The youth who move from SEIs to SCEs have heterogeneous profiles. 1.2. The accounts of educational agents and young people regarding the profile of the latter show an evolution in their socioeducational development between transitions from SEIs to SCEs and transitions from SCEs to SEIs.
2. Examine who is involved in decision-making in two-way transitions between SEIs and SCEs.	2.1. Higher secondary schools are widely involved in decisions to transition students to SCEs that occur before the students are 16 years old. 2.2. SCEs are widely involved in decisions to transition students to higher education institutions. 2.3. The two-way nature of transitions is not equitable: more occur from SEIs to SCEs than the reverse. 2.4. Young people and families have a limited role in decision-making regarding educational transitions.
3. Analyse the institutional articulation between SEIs and SCEs.	3.1. Transitions from SCEs to SEIs are considered and shared by all educational stakeholders before students' departure and are directed exclusively towards SEIs open to coordination. 3.2. For some schools, SCEs are a method of externalizing academic failure, and SCEs do not always respond to coordination requests once students are referred. 3.3. The demands of the graduate represent rigidities that hinder transitions to nonformal educational contexts.
4. Understand the effect of Spanish educational policies as a structural determinant in transitions.	4.1. Educational policies, especially in more regulated contexts, determine the profile of young people who transition and the educational offerings they access.

Note: Compiled by the authors

Method

The qualitative methodological approach analyses the experiences of educational agents and organizations in their natural and historical context, accessing a “reality” constructed and interpreted by those who inhabit it (Flick, 2004). This inductive process allows access to tacit knowledge from diverse information-gathering techniques on different agents participating in the journeys of these young people to holistically understand the subject of analysis on the basis of the triangulation of instruments and participants.

The starting theoretical perspective is symbolic interactionism. It analyses how individuals create and modify meanings through communication and social interaction, providing a unique perspective for understanding how they make sense of their social environment and construct their identity (Sosa-Sánchez, 2021).

Participants and Instruments

Semistructured interviews were conducted with 24³ individuals with management responsibilities in SCEs (13 women and 11 men), as well as with 9 tutors or advisors from SEIs (4 women and 5 men) who referred students to SCEs and/or, in some cases, re-enrolled students from SCEs. The SEIs were intentionally selected through active recruitment (Perelló, 2009) to ensure the two-way nature of the transitions. Four secondary and five vocational SEIs, six public and three private, were identified as having received referrals from SCEs. Six focus groups were subsequently held with 47 educators (29 women and 18 men) and six focus groups with 56 students (29 women and 27 men), belonging to 24 SCEs in Andalusia, Aragon, Catalonia, Castile and León, the Community of Madrid, the Community of Valencia, and the Basque Country. Participants were selected based on a maximum open design, which is sufficiently flexible to adapt to current availability (Guba, 1983).

3 Six of the principals lead organizations that promote several SCEs; therefore, the sample of participants represents 40 SCEs of the total number of accredited schools in Spain (43 in 2021, when field work began). The initial intention was to address all of the principals, but three excused themselves due to lack of time.

For the semistructured interviews, a script adapted to the profile of the interviewee was designed to address organizational, curricular, and orientation issues. For the focus groups, two semistructured scripts were developed, one for young people and one for educators. The first recapitulated the interviewee's experience prior to the SCE and the transition to it, comparing its teaching and learning process with that of the SEI. The second addressed the processes of access, reception, training, and intermediation/referral at the end of the process, as well as issues related to the direction and management of the SCE, drawing on the prior analysis of the interviews. The instruments allowed for the inclusion of emerging questions to delve deeper into the interviewees' responses and provide credibility by revealing contrasting beliefs among them (Guba & Lincoln, 1998).

Procedure

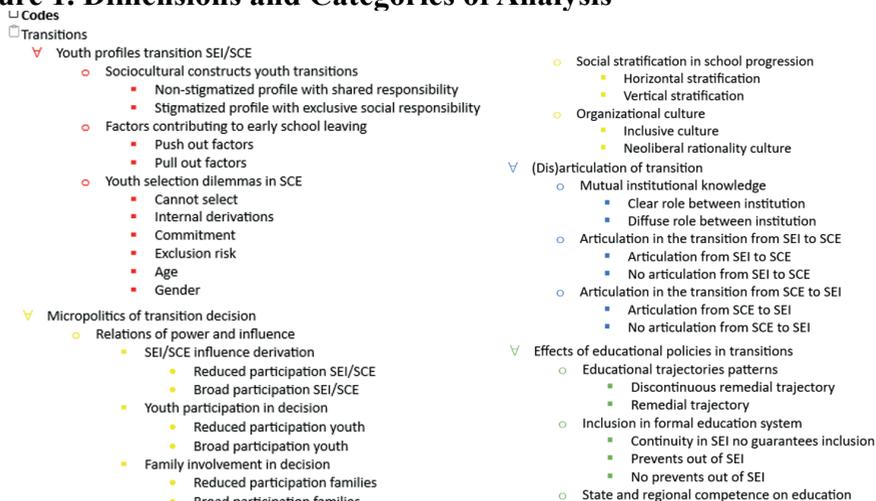
Field work took place between 2021 and 2023, with online interviews conducted between March and June 2021 and in-person focus groups conducted between October and November 2023 in six host SCEs. The research enabled the collection of information from semistructured interviews for subsequent verification through focus groups (Guba, 1983).

The research team established a two-phase protocol. The first phase provided an approximation of reality: i) consultation of the SCEs' institutional websites (March 2021); ii) semistructured interviews with SCE directors (April–May 2021); and iii) semistructured interviews with tutors/counsellors in the SEIs that referred students to and/or received referrals from SCEs (June 2021). The broader research continued while the interim reports were being prepared. In the second phase, to ensure the confirmability of the interpretations, iv) focus groups were held with educational teams and young people (October–November 2023), allowing the prior information to be supplemented with other stakeholders and the credibility of beliefs to be contrasted. The progressive development of the research provided consistency by identifying traceable factors that give meaning to information collection (Guba, 1983).

A priori axial coding was used, combined with emergent categories. Initial assumptions were generated, and the participating educational insti-

tutions were described to enable transferability to similar contexts. The reviewed transcripts were analysed using MAXQDA Plus 2022 on the basis of dimensions and categories (Figure 1), which demonstrated the confirmability of the data.

Figure 1. Dimensions and Categories of Analysis



Note: Compiled by the authors. Maxqda Plus 2022

A concordance analysis was performed using Cohen's kappa measure. The results of the calculations revealed that in 71.9% of the cases, both evaluators agreed ($P_o = 0.719$), and the probability of agreement by chance was 24.9% ($P_e = 0.249$). With the calculated Cohen's kappa coefficient ($K = 0.63$), it is concluded that the concordance between the researchers is substantial (Landis & Koch, 1977).

The codes for anonymizing the responses vary by the technique applied, type of institution, and reporting agent. They include code E for the type of institution—SCE or SEI—and, for the reporting agent, D for members of the management team and OT for tutors and guidance counsellors: E_SCE_Dx and E_SEI_OTx. For the focus groups, the code GD is used, followed by SCE and the agent's identification (E for educator and J for youth): GD_SCE_Ex and GD_SCE_Jx.

Results

Constructs on the profiles of young people who move to/from SCEs

The sociocultural profile constructs of youth who move between SEI and SCEs show dissonance in both individual and broad contextual factors. The factors that generate educational dropout (*pull vs. push*) affect the definition of selection criteria in the SCEs (Table II).

Table II. Profiles of young people who move from SEIs to SCEs

Category	Subcategories	Analysis	Re-search 1	Re-search 2
Constructs of the sociocultural profiles of young people who move between SEIs and SCEs	Dissonances in the construct	Stigmatized profile of the young person with almost exclusive responsibility (Morel, Palier and Palme, 2013)	23	23
		No stigmatized profile of the young person with shared responsibility	29	28
Factors in educational abandonment (Nes, Demo & Ianes, 2017; NESE, 2009) among young people who transition to SCEs	<i>Pull out factors</i> (Tarabini, 2016)	Desire to work, peer expectations regarding SCEs	9	9
	<i>Push out factors</i>	Low socioeconomic status, migration or ethnic minority origin and/or problematic school careers	7	7
Dilemma of youth selection in SCEs		Age, gender, risk of social exclusion and commitment	47	46

Note: Compiled by the authors

Young people who transition from secondary schools to other secondary education have experienced previous disruptions in their educational journeys. These are deviations from linear trajectories that result from institutional regulations, poor performance, behavioural problems, disaffection with the school, and/or conflicts with teachers. Three young people expressed this:

I also failed, because I repeated the secondary education, and I repeated it again, but since I couldn't repeat it again... (GD_SCE_J2: 26).
 (...) I didn't study anything. I just didn't like it (GD_SCE_J5: 239).

At school, I had a bad temper; I fought with the teachers (GD_SCE_J1: 416).

These ruptures are also marked by life paths. Tutor teachers and guidance staff at secondary schools consider these young people “conflictive, with profiles that are sometimes very unmotivated, because they have a very complex personal history (...) with many difficulties” (E_SEI_OT4: 6). They allude to the fragility of the young people’s mental health: “it is very vulnerable and therefore full of stress, anxiety, anguish and insomnia, (...) personal and psychological suffering” (E_SEI_OT6: 3). They mention that the young people may be from low-income families and/or immigrants: “Humble, working-class people from the neighbourhood, along with a very large enrolment of migrant students” (E_SEI_OT6: 2). They are students who, in the formal educational context, “do not trust school at all” (E_SEI_OT6: 8) and who experience “disaffection towards learning” (E_SEI_OT6: 3).

The SCEs distance themselves from the stigma of considering them as bad, conflictive students and warn of the need to delve deeper into the reasons for their difficulties in school:

(...) Normally these kids, bad students, that is, “I have all the possibilities in the world and I haven’t wanted to study,” very few. (...) There’s always something else behind it and that’s where you have to get to ... (E_SCE_D32: 105).

Some of these kids come here with anger towards everything (...) because no one has stopped to tell them, “Anyway, you’re not doing things that badly” (E_SCE_D7: 19).

SCE educators question the labelling produced by the institutions that derives from the following:

(...) the vast majority come from other entities and..., it is true that they label us: “well they are like this, they are like that”. Our job is to try not to place those labels on them (GD_SCE_E6: 131).

While the educators also emphasize the students’ cognitive development, in some cases, they work with young people diagnosed with disabilities, and in others, they identify disabilities upon the students’ arrival:

(...) you come across many profiles, sometimes also undiagnosed profiles, but that could be (E_SCE_D21: 30).

The young people do not always have basic needs met, such as the right to decent housing, with significant implications for the pedagogical relationship:

When you have children sleeping on the street, you can't say "at 6, I close the blinds, I go home and I forget" (GD_SCE_E2: 136).

Educational teams note differences in the students' age at arrival. When they are younger, "it's very difficult for them to make that journey. They're here because they don't want to continue studying. They're unable to see beyond that" (E_SCE_D5: 259).

They are *push* factors that trigger these transitions for young people at a low socioeconomic level and/or who have a migration background or ethnic minority origin and/or problematic school career: "children who are in a vulnerable situation" (E_SCE_D17: 8).

A gender gap is also evident when students enter SCEs: "there are fewer women than men" (GD_SCE_E5: 16). Educational teams justify this by citing reasons related to training supply and demand, as well as contextual factors. They believe that, in many cases, the family context places women in the private sphere, where "training is not necessary" (GD_SCE_E1: 98). One young woman expressed this:

(...) I come from an environment where a woman's worth is for the house, the children and all that, and to get to this moment and be able to do something more, be able to work in something else... (GD_SCE_J5: 343).

SCE schools' selection processes are crucial in defining the profile. The regulations explicitly state that these schools are aimed at young people "aged 15–30 who have not completed compulsory secondary education" (E_SCE_D2: 4) and are therefore "at risk of social exclusion" (E_SCE_D16: 11). Economic difficulties are also highlighted: "their unique economic situation is key" (E_SCE_D2: 4). Sometimes they exclude young people by requiring prior knowledge "such as attending a literacy school first" (E_SCE_D17: 70). SCE that offer vocational training courses do not participate in their selection processes: "it's given to us, we don't select" (E_SCE_D24: 139).

The educational teams all note the need for commitment from entering students, "really seeing the motivation" (GD_SCE_E6: 31), justify-

ing “betting on people who are looking for a new opportunity” (E_SCE_D2: 4). However, they are not exempt from pressure to produce results that perhaps force them to “demonstrate the efficiency of the project to the funder” (E_SCE_D17: 109). In certain programs, it is “very demanding and forces you, almost in the selection of young people, to say ‘hey, if this one is going to leave me after two days, I’m not going to take him.’ It’s very perverse” (E_SCE_D17: 109).

Tutors and counsellors at secondary schools assess young people when they return after their time at an SCE school. This assessment differs from their initial assessment, highlighting their greater maturity and responsibility in their work: “I find them very formal, very hard working” (E_SEI_OT5: 5). However, we find cases without differentiated follow-up for students arriving from SCEs: “It’s a vocational training program; here, it’s about everyone entering through the same system” (E_SEI_OT2: 7). Additionally, horizontal stratification is evident in transitions to workshop schools: “They are programs specifically designed for those people” (E_SEI_OT2: 6).

On the other hand, SCE educators see a clear “evolution or opening and also increasing effort and success stories” (GD_SCE_E5: 19) in the youth who participate in their schools and complete the training programme: the vertical stratification is softened by new transitions after their time in SCEs.

Young people express the profound change they have experienced after participating in SCEs, which have broadened their educational, professional, and relational expectations and aspirations:

Now I am finishing my high school diploma, and apart from that, I want to take more courses (GD_SCE_J3: 197).

Fights with my parents, fights in the street, (...) I joined [SCE name] and look, the relationship with my family is perfect. I’m very happy (...). I’m getting what I have to get out of it (GD_SCE_J2: 142).

They are young people who do not fit into the formal education system, establishing a relationship of mutual distrust, but who find acceptance and support in SCEs, which generates positive feelings towards education, largely determined by how SEI teachers and educators describe these young people: “I accompany you in this process of improving your skills, it is realizing where you have to be and the itinerary can last a year or two, what the young person

needs” (E_SCE_E34: 29).

Micropolitics in the decision to transition between SEIs and SCEs

Different actors intervene in the decision to transition, make decisions about the transition, and influence the ability of youth to overcome their initial situation, which leads to educational abandonment (Table III).

Table III. Micropolitics in the decision to transition

Category	Subcategories	Analysis	Research 1	Research 2
Power and influence relations between educational agents	SEIs/SCEs influence referral to SCEs/SEIs	Wide influence	4	4
		Reduced influence	1	1
	Youth participation in the decision to transition	Broad participation	13	14
		Low participation	5	5
	Family participation in the decision to transition	Broad participation	7	7
		Low participation	5	5
Social stratification in school progression (Solís and Blanco, 2014; Rojas, 2020)	Horizontal stratification	Unidirectional majority stratification: SEIs to SCEs	14	14
	Vertical stratification	Opportunity to overcome stratification: transitions from SCEs to SEIs	5	5
Organizational culture (Valdés and Pérez, 2021)	Culture of neoliberal rationality	Emphasis on academic and disciplinary dimensions. Institutional verticality. No/limited educational support.	44	42
	Inclusive culture	Emphasis on the individual from a holistic perspective. Collaborative practices. Importance of welcome and support.	79	77

Note: Compiled by the authors

The decision to move to SCEs before completing compulsory secondary education is led by secondary schools and the educational inspec-

torate, which adhere to educational regulations and horizontal verticality. Secondary school professionals assess the need for this transition following poor results of previous initiatives such as an “individualized plan” (E_SEI_OT4: 6), “educational reinforcement, curricular adaptations, repetitions (...)” (E_SEI_OT2: 3). They also use repressive measures: “there has to be some expulsion, some sanction...” (E_SEI_OT1: 4). When students do not respond, the institution considers a transition: “that’s when we begin to consider another type of education” (E_SEI_OT4: 6). These stories exemplify the neoliberal rationality of the formal system.

Guidance professionals at secondary schools contact SCEs and share the proposal with the students and their families, who then make the final decision, although the institution presents only one option. These proposals typically involve young people under age 16 who have not completed their compulsory schooling. Both institutions state the following:

(...) when a student here was not functioning and we did not know what to do with him, before he dropped out (...) he contacted [SCE name] through a psychopedagogue from the Guidance Department and, then, through inspection, the documentation is filled out and he is referred, well, we talk to the student and the family, they sign if they agree and he goes to the SCE (E_SEI_OT4: 4).

(...) almost everything comes through the guidance counsellors who usually stay at the centres. They usually come in groups, meaning the guidance counsellor with five kids from the centre (E_SCE_D6: 68).

Students also note the initiative and the power exercised over their own professional and life projects by the SEI as promoters of their departure and referral to SCEs. SEIs sometimes use this power in an imposing manner, which silences the students’ stories, ignores their right to choose and stigmatizes the SCEs by characterizing them as a punishment. The students highlight the SEIs’ emphasis on discipline and the lack of support:

I repeated a year in compulsory secondary school, then in my second year I had an accident and the headmistress grabbed me by the arm, firmly, took me to the office and sat me down and said: I’m going to send you somewhere [SCE], and she spoke to my parents. She explained it to me like hell... I was even furious” (GD_SCE_J2: 27).

At first, I was forced to join the cycle. (...) And I ended up liking it and now I work in that field (GD_SCE_J6: 177).

The training path for the transition to SCEs does not seem to be a major concern at the time of students' exit. Little thought is given to what vocational training these students, who have been expelled from the formal system, wish to pursue:

We need help to clarify things (...) the orientation in SCEs is lacking, they don't know what they want to do (E_SEI_OT9: 4).

I asked a boy: Why did you come here? He said: Well, because at school they told me to come to the mechanics school and because my mother did too (GD_SCE_E2: 54).

Families are also considered. High schools inform them about young people's progress: "If they are not emancipated, we must inform them (...)" (E_SEI_OT2: 8). However, according to high schools, families are not always present or do not have the necessary resources to address problems of adaptation to the educational system. The schools sometimes demonstrate a classist view:

(...) there are no families behind it or not as any teacher with a need would expect, they pick up the phone and behind it there is a family with availability of schedules and resources... (E_SEI_OT6: 2).

In contrast, the SCEs rely more on the influence of families and bring them closer to the centre to make them participate: "The reception is done with the families, they are the ones who decide" (GD_SCE_E1: 83).

Young people seem to have less of a say in this selection process. When they do not participate in the process and are subjected to pressure from secondary schools and/or their own families, they can also drop out at the SCE level:

(...) there is usually some dropout (...) these are young people who come under great pressure, either from their family or from their teachers, and they don't want to do anything (E_SCE_D32: 111).

The above situation is corrected with welcoming processes upon arrival at the SCEs, which include orientation sessions. SCEs are promoted as inclusive environments, where decisions, goals, and individual itineraries are agreed upon and young people are the protagonists in their life projects:

(...) individual objectives that are made in consensus with the student (GD_SCE_E1: 135).

In the end, the decisions are theirs, and many times, no matter how much you have told them, they decide other things (GD_SCE_E4: 433).

Some young people highlight their desire to work, a *pull factor* that can make exiting the institution more appealing but that requires prior professional training that they do not always have:

Many kids want to work now. And you tell them, well, to work, you still have to prepare the way (GD_SCE_E1: 145).

SCEs become, in some cases, a *pull factor* because of their greater attraction for young people compared with institutions on the basis of recommendations from their peers: “my brother was here and a friend called [name] talked to me a lot about here” (GD_SCE_J1: 240).

In other cases, the students’ choices reflect the degree to which their own preferences match the offers, subject to structural limitations: “In the Department of Education criteria, you can put several options for enrolment, but of course, you don’t always get in the first one, if there are no places...” (GD_SCE_E4: 50). Young people weigh different training courses that they do not always find desirable, together with SCE counsellors, and use “rational compensation” mechanisms for second or third options, where the young people’s desires are postponed.

I wanted to do aesthetics, but [SCE name] has x courses. It’s not that they have all the courses available, it’s that maybe there’s another course and they suggest to you: there’s this course and this one. So you don’t have to take this gap year... (GD_SCE_J6: 230).

The transition from SCEs to SEIs is residual. Professionals at some SEIs do not consider it viable for students to return from SCEs: “They’re doing very well there, and when they leave, they don’t really come back here because there are no opportunities...to do baccalaureate... Before that, they do a medium-level training cycle” (E_SEI_OT4: 5).

The referral from an SCE is directed to vocational training institutions to expand the young people’s professional skills and to adult education schools (EPAs) to consolidate basic skills: “We have those who go to inter-

mediate-level cycles and those who do not manage to get in (...) go to finish ESO at an EPA” (E_SCE_D32: 153).

There are still gaps in the transitions between re-entry into education and the labour market:

There are young people who complete their vocational training. They want to work no matter what, they work for a year, then realize they want something more and come to evening classes to prepare for the entrance exam or finish high school (E_SCE_D32: 65).

Decisions to transition between SEI and SCEs are made primarily by these institutions, limiting the choices of students and families to the reception process carried out by the SCEs. Transitions are not truly two-way, with moves from SEI to SCEs being more common. Some transitions to intermediate vocational training occur within SCEs themselves:

We have a basic and intermediate grade group from the same family. Twenty percent of the places in the intermediate grade are reserved for those coming from basic education. (GD_SCE_E4: 74).

(Dis)articulation of the transition

The articulation of the transition demonstrates levels of coordination and mutual understanding between SEI and SCEs. This allows us to analyse whether opportunities for collaboration exist to benefit the continued education and/or employment of the young people in the study (Table IV).

Table IV. (Dis)articulation of the transition

Categories/Subcategories	Analysis	Research 1	Research 2
Mutual institutional knowledge	Effort to spread one's own role among institutions	9	9
	No dissemination of one's own role among institutions	4	4
Articulation in transition from SEIs to SCEs	High	32	31
	Null	11	10
Articulation in transition from SCEs to SEIs	High	12	12
	Null	7	7

Note: Compiled by the authors

With respect to mutual knowledge, SEIs do not take actions to make themselves known to SCEs: “No, unless we have students in common or in referral processes, in which case there is coordination and relationship with those centres” (E_SEI_OT3: 2).

In contrast, SCEs value the fact that SEI are aware of them: “It’s extremely important to inform the institutes and their guidance counsellors about the existence of the SCEs so they know there are other options” (GD_SCE_E6: 151). SCE managers consider this proof of good coordination and consolidation among the organizations.

The institutes know us, right? And it’s a history of coordination and collaborative work (E_SCE_D13:16).

(...) we are a well-established entity. They know us where we are, in the neighbourhoods: social services, schools, etc. (E_SCE_D3: 118).

Coordinating the process is complex for children under age 16, who remain linked to both institutions: enrolment remains with SEIs, but training and assessment are carried out by SCEs:

(...) they are enrolled in their SEIs and to the extent that the institute wants, they come to a social and employment centre, but their official enrolment remains at the institute because they are under 16 and we set the grades [SCE]. (GD_E20_E1: 174).

Articulation through meetings between institutions is considered common by the SEIs: “I do see many educators from [SCE name] who meet with

the institute tutors” (E_IES_OT6: 4).

The SEIs acknowledge that the SCEs provide useful differential resources to prevent school dropout, “with lower ratios and much more personalized, and perhaps much more manipulative, everything. That’s where they respond” (E_SEI_OT4: 6). They value the follow-up provided by the SCEs and believe that young people do as well: “following up on how to ensure that the person who has returned to school is well supported (...). I think the children perceive that” (E_SEI_OT6: 5).

The initial reception at the SCE is a careful process: “the kids come to us, there is a selection, an orientation is done so that the kids and we see (...). It is the process” (GD_SCE_D2: 75).

In referrals from SCEs to SEI, mainly those for Vocational Training (VT), the SCE tutor contacts the SEI: “the experience with some SCEs is that it is usually the tutor who makes the contact” (E_SEI_OT2: 7). The SCE tutor “must send the VT advisor the report that allows access to the Basic Vocational Training (BVT), as regulated by legislation” (E_SEI_OT2: 6). However, “in access to the intermediate and advanced levels, the school of origin does not provide reports or documentation unless the VT advisor requests them” (E_SEI_OT2: 6).

The SCEs try to “return them to the educational system, so that they can resume their... [training]” (E_SCE_D7: 13); however, referrals to training do not always occur within the regulated educational system.

Referrals to secondary schools by SCEs are sometimes accompanied by requests for support to improve the students’ adaptation to the secondary school:

There are some who have graduated in the workshop classroom, spectacular processes, and you think they will be able to sustain a cycle. (...) Well, after 4 days, they [teachers from the institution] come asking for guidance, because they are not well (GD_SCE_E2: 119).

A paradox arises if SCEs’ referrals to institutions, usually vocational training institutions, are not taken care of: the risk of dropping out is transferred to higher education when a referral is made back to the formal education system, evidencing, in many cases, the maintenance of vertical stratification after passing through the secondary education.

Therefore, coordination is led by SEI when they aim to refer these young people. SCEs place greater emphasis on supporting young people during these processes and use coordination as an enabling element.

Effect of educational policies on transitions

Despite political ups and downs and successive educational reforms in Spain, the reforms' implementation defines significant transition models and patterns of educational trajectories (Table V).

Table V. Effect of educational policies on transitions

Categories/Subcategories	Analysis	Research 1	Research 2
Inclusion in the formal education system (Morentin and Ballesteros, 2024)	Students do not leave SEIs	15	15
	Does not prevent students' leaving SEIs	6	6
	Continuing at SEIs does not guarantee inclusion	6	6
Patterns of educational trajectories (Walther et al., 2015)	Academic fluency	0	0
	Academic discontinuity	0	0
	Smooth career paths	0	0
	Discontinuous career paths	9	9
	Remedial or intermediate trajectory	13	13
Regional educational competence	Diverse solutions to inclusion	10	11

Note: Compiled by the authors

Organic Law 3/2020 on Education and Organic Law 3/2022 on the organization and integration of vocational training emphasize inclusive education. The continued availability of the basic vocational training cycle in secondary schools, aimed at young people under 16 years of age who have difficulty following mainstream education, also consolidates a remedial career path:

(...) with 15 years old in the school year (...) they can enter the BVT, and this (...) has reduced the demand for schools... (E_SEI_OT8: 2).

Now, with just three failures, you can finish (...) The system, the schools, are taking on students who used to come to us. Yes, the BVT and accessibility to promotion (GD_SCE_E1: 211).

The evolution of the profiles of young people who transition to SCEs is subject to these regulations: “We currently don’t have anyone with a high school profile” (GD_SCE_E1: 206). SEIs are critical of the application of these regulations, considering that the problems are not resolved within the formal education system, which is incapable of offering anything more than remedial paths. Among those who value transitions to SCEs, a more appropriate response is as follows:

(...) they [the SCE] have been left with less support, a little lack of institutional support so that they can develop their activity as they did, and that, at the centre level, was very important, due to the level of maturity that the students bring (E_SEI_OT8: 8).

However, outsourcing and referral continue to occur in some autonomous communities that have not integrated the BVT under “shared schooling” formulas, which ultimately relegate students exclusively to SCEs: “Shared schooling, as such, does not exist. They don’t go to school some days and come here other days, but it is always here” (GD_SCE_E2: 23).

SCE educational teams consider the response regarding the VT offered by the institutions to be incomplete. It is practical and manipulative training but lacks a comprehensive approach:

(...) you can start to detect in the orientation some students who may need something more practical, and I think it is a very good option... But (...) there is also a part of demotivation or there is a process of integration into a society, that is, it is broader (GD_SCE_E2: 312).

There is also a high percentage of immigrants in some territories, reflected in the profile of SCE candidates: “There are constant arrivals of foreign-born people, newly arrived in Spain, with a lack of Spanish. In other words, are they an SCE participant? It’s textbook, but we need a base” (GD_SCE_E1: 65).

On the other hand, the assumption of educational responsibilities by regional governments has led to differentiated training offerings in each region’s SCE programs. Only a few regions, such as the Basque Country, offer

a secondary education degree and/or a vocational training qualification (common in primary and secondary education and training and less common at the intermediate and advanced levels). Among the benefits of this regulated vocational training are reduced tensions in secondary schools and the guarantee of success due to accumulated expertise, with the regional government establishing admissions guidelines:

(...) you welcome them and inform them about the course, their current situation, where they come from, what qualifications they have or don't have (...) who is admitted to each of the courses? ... part of the Basque Government, the guidelines it sets, what order it will implement in admission (GD_SCE_E4: 14).

Discussion and Conclusions

The results challenge the dominant discourse that assumes homogeneity in the profiles of young people in SCEs (García Gracia & Sánchez Gelabert, 2020). Regarding the profiles of young people who transition between SEI and SCEs, different perceptions are observed. SEI professionals highlight the disengagement and poor performance of young people, in addition to the complex social context; SCE educators emphasize the opportunities for change and the strengths of young people and their families. The experience in SCEs also makes young people more aware of their transitions, reinforcing the idea of different perceptions between SEI teachers and students when interpreting the disruption in the classroom (Martínez Fernández et al., 2020).

With respect to the decision-making process regarding the transition, neither young people nor their families have much agency. The scarcity of economic, cultural, and social capital (Scandurra et al., 2020) limits their participation in social life and the definition of their life plans. Thus, “peripheralization” is reproduced (Naumann & Fischer-Tahir, 2013), even with programs aimed at equal opportunities. Some results show young people’s disaffection with SEI, while their connection to SCEs and their educational continuity are strengthened (Solís & Blanco, 2014). Preventive measures become compensatory when they do not ensure permanence in the system. This work helps

show how, in many cases, young people are not the ones who make the decision to transition to SCEs but rather accept their “degradation” and end up believing it was their choice (Rujas, 2020). Formal guidance from secondary schools and the informal influence of family or friends influence a process known as “cooling off” (Walther et al., 2015), which hides the selective function of the educational system, although superficially, it seems to offer them “opportunities in life” (GD_SCE_E3: 81). In doing so, the school system seems to treat them fairly, but the pattern that best represents their transition to SCEs is *remedial*. The educational trajectories of young people who enter intermediate courses or compensatory prevocational schemes are observed, with qualifications that show horizontal and vertical discrimination. However, upon entering SCEs, they gain prominence owing to the guidance and support they receive, reconstructing their identity, broadening their awareness of their professional and life projects, and opening up opportunities for discontinuous professional trajectories. In some SEI, a neoliberal organizational culture is observed that blames young people who do not adapt to the system, whereas in SCEs, an inclusive culture of collaborative work, care, listening, acceptance, and individualized follow-up prevails.

One limitation of this study is the time gap between the interviews (March–June 2021) and the focus groups (October 2023), although it did allow for the inclusion of questions about intermediate outcomes. Additionally, it would be useful to take a qualitative longitudinal approach in future research to explore the educational and employment trajectories of these young people after their time in SCEs.

Greater coordination between the formal and informal education systems on the basis of mutual understanding, coordination, and commitment is needed. If the formal system has structural limitations in serving certain groups, the more flexible and adaptive informal system must be strengthened to improve the transitions of groups experiencing disaffection into the education system. With these key elements in mind, support will be effective; in contrast, the different structures will only “allow the ‘diversion’ of those who will inevitably drift” (Funes, 2009, p. 61).

Educational inclusion, championed by Lomloe (2020), seeks to resolve tensions between comprehensive education up to the age of 16 and the

diversification of educational pathways at early ages. This debate must consider the relevance of the educational context. Nonformal contexts, such as SCE, offer solutions to young people excluded from the formal system. The dilemma of education within or outside the formal system raises questions about the effectiveness of high school education for students with negative school experiences who require more in-depth support and guidance.

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Socio-educational strategies and benefits in Basic Vocational Education and Training: The case of the Basque Country

Estrategias socioeducativas y beneficios en la Formación Profesional Básica: el caso del País Vasco

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Abstract

This article seeks to identify the benefits derived from students' experiences in Basic Vocational Education and Training (Basic VET) and to analyse the socio-educational strategies that make it possible to attain these benefits. The study draws on the perspectives of 132 people (students, family members, educational staff, and leadership teams) collected through 17 focus groups (six face-to-face and 11 online) in 12 centres across the Basque

Country. The results show that students' experiences are not only limited to academic gains but also influence personal and familial domains, as well as relationships with peers and other adults. By creating positive experiences, the educational team fosters an environment where students and their families feel protected and welcomed. The results of this research underscore the importance of training in socio-educational strategies for future education professionals, particularly in Basic VET.

Keywords: basic vocational education and training, early school leaving, social inclusion, teaching staff, families.

Resumen

El presente artículo busca identificar beneficios de la experiencia como estudiante en la Formación Profesional Básica (FPB), así como analizar las estrategias socioeducativas que permiten alcanzar dichos beneficios. Se han analizado los discursos de 132 personas (estudiantado, familiares, equipo educativo y directivos) a través de 17 grupos de discusión (6 presencial y 11 online) en 12 centros del País Vasco. Los resultados muestran cómo la experiencia no sólo se limita a beneficios académicos, sino que trasciende a ámbitos personales, familiares, de iguales y de relación con otras personas adultas. Esto es posible debido al diseño de experiencias positivas por parte del equipo educativo que generan entornos donde el estudiantado y sus familias se sienten protegidos y “re-cogidos”. Los resultados de esta investigación profundizan en la importancia de la formación en estrategias socioeducativas de futuros profesionales de la educación, especialmente de la FPB.

Palabra clave: Formación Profesional Básica, Abandono Escolar, Inclusión social, profesorado, familias.

Introduction

Unlike the early 20th century, when attending school almost always guaranteed employment and social integration, today it primarily serves to acquire core citizenship competences and basic training to be able to pursue different specialised pathways. The experience and development of these citizenship competences may be hindered depending on students' engagement with the training offered, which is conditioned by the prevailing educational models in schools (Tarabini et al., 2019). In this regard, the proliferation of international studies on early school leaving highlights the challenge faced by the cur-

rent education system to guarantee quality and equal opportunities for learning and growth. The phenomena of school failure and early school leaving are influenced by multiple factors, including endogenous dimensions (personal and relational) and exogenous (structural and institutional) (Romero & Hernández, 2019, p. 268), which hamper personal and professional development in terms of access and participation, as well as impeding social mobility (Morentin-Encina & Ballesteros, 2020; Santibáñez et al., 2024). In Spain, the percentage of early school leavers in 2023 was 13.6%. While the data has been improving over the years (down 0.3 percentage points compared to 2022, at 13.9%, and 10.0 points compared to 2013), and the gap with the EU has also been decreasing (4% in 2022) (Ministerio de Educación, Formación Profesional y Deporte del Gobierno de España, 2024), the education system continues to implement reforms and modifications in education to mitigate early school leaving.

Since the 1980s, various laws have been passed with each proposing different programmes that seek to alleviate the issue of early school leaving and school failure in diverse ways: from the Social Guarantee Programmes, which were replaced by the Initial Vocational Qualification Programmes and later by Basic Vocational Education and Training (Basic VET) or Basic Level in Vocational Training. These legislative changes are aimed at improving the educational needs of the most vulnerable groups in order to avoid potential segregation. Concerning VET, a notable milestone of the current Spanish education law, LOMLOE, was its incorporation into the general education system, which in turn allowed for specific adjustments and adaptations to VET (Santibáñez et al., 2024). However, the recent report published by EUROCHILD (2024) reminds us that these measures are still ineffective.

As described in previous works (Piñero et al., 2024), Basic Vocational Education and Training (Basic VET) programmes are designed for students between 15 and 17 years of age who, having completed the third year of Compulsory Secondary Education or, in exceptional cases, the second year, are at risk of school failure or have already failed. These programmes are developed over two academic years and are aimed at those students who have not yet completed Lower Secondary Education and wish to continue their compulsory education free of charge. At the end of this programme, students can obtain

the Basic Professional Technician certificate, which facilitates access to intermediate vocational training. Moreover, by taking the final assessment test, they also have the chance to obtain the Compulsory Secondary School qualification, which allows them to continue in the education system and return to it at the end of the programme (Aramendi & Etxebarria, 2021; EUSTAT, 2024; Sarceda-Gorgoso & Barreira-Cerqueiras, 2021).

The purpose of these models is to rethink the curricula that cater to this diverse population that has been left out of the mainstream education system, addressing issues related to the inequality or discrimination they suffer in their educational pathway, seeking to overcome the individualistic perspective rooted in school failure, which reflects a *deficit paradigm* by placing the blame on students. To this end, they take *ad hoc* measures that prioritise the uniqueness of learners (Fernández-García et al., 2019; Santibáñez et al., 2024) and apply a systemic perspective that tackles the problem from a holistic, multidimensional approach (Aramendi et al., 2022; Aramendi & Etxebarria, 2021) or through a multifaceted lens (Echeita, 2019). Also stressed is the importance of cooperation among educational, economic, and social institutions to support the real integration of young people in society and the labour market (Aramendi et al., 2018).

A number of VET students are characterised by their negative educational experiences, high levels of demotivation, low self-esteem, aversion to learning, insecure behaviour and, in some cases, non-cohesive family environments (Fundación Tomillo, 2022). Similarly, there is a problematic use of free time, issues with discipline, emotional and social deficiencies (Aramendi et al., 2022), isolation, and low job expectations and lack of opportunities (Fernández-García et al., 2019), all of which ultimately have an impact on access to rights such as employment and housing (Martínez-Carmona et al., 2024; Sarceda et al., 2017).

Given that several studies have underlined the key role teachers play in students' academic school success and social inclusion (Aramendi et al., 2022; Aramendi & Etxebarria, 2021; Gagnon & Dubeau, 2023; Miesera & Gebhardt, 2018; Van Middelkoop et al, 2017; Viniegra-Velazquez, 2021), it is essential to address the evolving professional profile that is required to ensure that the change in the methodological paradigm, which is more fo-

cused on socio-emotional and competence development (Sánchez-Bolívar et al., 2023), is real and successful. In this sense, teachers who are sensitive to diversity (Aramendi et al., 2018) act as a safeguard by motivating learners to study, building relationships of closeness and trust with students, fostering confidence, and facilitating the possibility of family commitment and engagement (Salvà et al., 2024). The recent CaixaBank report on dropout in VET (Salvà et al., 2024) includes various studies that confirm and support this idea. Thus, when there are opportunities to develop positive relationships between teachers and students, and among peers, the feeling of belonging and commitment to school increases, both inside and outside the centre (Salvà et al., 2024). In turn, there is a direct relationship between students' social skills and their commitment to the educational system when there are opportunities for joint student-teacher participation and involvement in issues related to the school's daily life (Salvà et al., 2024). Maintaining such a professional role can take an emotional toll on the educational team (Fix et al., 2020), even more so when the context lacks the necessary support or resources (Gagnon & Dubeau, 2023).

It is imperative to coordinate the various agents involved, since the three systems, family, peers and educational, foster students' self-concept as a mediating variable, which subsequently has a direct impact on school engagement (Ramos-Díaz et al., 2016, p.349). From a systemic perspective (Bronfenbrenner, 1992), the school's responsibility extends beyond the microsystem, incorporating elements belonging to the mesosystem, in order to improve the students' interactions with their closest environment, especially with their families (Sureda-García et al., 2021). Research has shown that positive collaboration between schools and families has a direct impact not only on students' academic achievements at an emotional and social level, particularly in those who may be in a situation of social exclusion (Gálvez, 2020), but also on the improvement of skills, school engagement, and student behaviour in terms of prosocial behaviour and emotional regulation (Antelm-Lanzat et al., 2018). Various studies point to the importance of providing families with the chance to become highly involved and participants, given its effects on factors such as early school leaving and better academic performance (Hernández-Prados et al., 2023).

Method

This article seeks to identify the benefits derived from students' experiences in Basic VET and to analyse the socio-educational strategies that make it possible to attain these benefits. The research questions that have guided the analysis have been the following: What benefits are perceived by the different agents involved in the Basic VET model, and how do they experience these benefits? What happens within these spaces? How are different situations addressed? The aim is to contribute to current debates on socio-educational practices in the context of Basic VET.

A qualitative approach was selected because of its comprehensive nature, which offers a set of tools and perspectives that are fundamental to gaining insight into the complexity of social phenomena. Conceptualising and exploring phenomena such as positive experiences requires an approach that captures the richness of narratives and interactions, and the process of category description emerges as an essential tool for organising and analysing qualitative data in a systematic way (Flick, 2014).

Sample

A convenience sample was collected from the VET centres invited to take part once the project had been explained. The decision to use a convenience sample in the selection of the participating VET Centres was based on practical and logistical considerations. Due to the exploratory nature of the study and its objective to gain an in-depth understanding of the dynamics and benefits experienced by the different educational agents in VET, priority was given to accessing centres that were willing to participate and reflected the territorial diversity of the Basque Country (Bizkaia, Gipuzkoa, and Araba).

Recognising the limitations of convenience sampling, this approach allowed for the inclusion of a variety of perspectives from students, families, teaching staff, and leadership teams, thus enriching the data collected. The

groups provided a setting for generating rich and detailed data, which contributes to a deeper understanding of the subject. As highlighted by Morgan (1997), group interaction in focus groups facilitates access to the complexity of opinions and experiences, even when the sample is non-probabilistic.

The sample was selected according to territorial criteria (three provinces) and the inclusion of educational actors in Basic VET programmes (students, families, teaching staff, and leadership teams). Thus, there were seven groups of students (three in Bizkaia, two in Gipuzkoa and two in Araba), six groups with families (two in Bizkaia, two in Gipuzkoa, and two in Araba), three groups of teaching staff (one per province), and a group made up of members of leadership teams from all over the Basque Country. In total, 17 focus groups were held (six face-to-face and 11 online) in 12 centres in the Basque Country. Specifically, a total of 132 individuals participated.

Instrument

Focus groups were used to obtain detailed information about participants' experiences, perceptions, and opinions (Barbour, 2011). The choice of the focus group methodology was primarily to promote interaction between participants, not only to gain a more complete understanding of good practice by contrasting different points of view, but also to identify shared definitions of what constitutes good practice in vocational education and training, as well as gathering new ideas and perspectives that emerged from the collective dialogue.

Focus groups stand out as spaces where interaction and dialogue allow access to the social construction of meanings. Guided by a moderator, these groups generate data by collectively exploring a topic, and their validity depends on careful planning, effective moderation, and a rigorous analysis of the information produced (Krueger & Casey, 2014). Thus, by bringing together those directly involved in VET (students, teaching staff, leadership teams, and families), the focus groups provided an authentic and contextualised view of good practices from different discursive positions (Burguera-Condón et al., 2021), which contributed to obtaining results applicable to the real context of VET, in addition to pinpointing concrete strategies that were perceived as

effective by the participants themselves.

The focus groups were carried out between January and May 2023, with the face-to-face groups conducted in the centres, while the online groups were used for participants from other centres. The sessions were recorded, prior to which participants were explained the purpose of the study and the conditions of participation, along with the ethical considerations related to confidentiality and data protection. After they had accepted and signed the informed consent form, the sessions were carried out, with the research team taking field notes throughout this process. The research was approved by the Ethics Committee of the University of Deusto (Ref:). ETK-51/21-22.

Procedure

The analysis presented here is based on the transcripts of the focus group recordings (17h and 30 min of audio), as well as the field notes taken by the research staff. To preserve confidentiality, testimonies are identified by initials.

All the material collected during the fieldwork was processed with the qualitative analysis programme *Atlas.ti 24*. Taking into account the research objectives and the relevant scientific literature, the analysis was undertaken by three researchers from the project team who conducted successive revisions of the assignment and selection of categories within the qualitative data through a deductive coding process. During this process, certain categories of analysis were reordered, and some emerging ones were also incorporated from the reading and re-reading of the texts. Phenomenological qualitative analysis was used to explore and understand the lived experiences of individuals in relation to good teaching practices in VET. Ultimately, the aim was to obtain rich and profound descriptions of participants' experiences, paying special attention to the context in which the experiences take place (Alvarado, 2023).

Finally, the analysis focused on the most relevant categories within the dimensions studied: a) perceived academic and personal benefits or those associated with peers and family members; and b) socio-educational strategies inside and outside the classroom.

TABLE 1. Main Categories and Subcategories of Analysis

Main Category	Subcategory	Approach	Description
Perceived Benefits	Academic	Etic	Improvements in performance and skills acquisition.
	Personal	Emic	Promotion of self-concept and self-esteem.
Socio-Educational Strategies	Welcoming	Emic/Etic	Creation of a supportive and safe environment.
	Flexibility	Etic	Adaptation of educational practices to the needs of students.
	Communication with Families	Emic	Development of collaborative relationships with families.

Source: Compiled by the authors

The analysis of the qualitative data was undertaken through an iterative process combining *etic* and *emic* approaches (Flick, 2014). Initially, *etic* categories derived from existing literature on early school leaving and socio-educational strategies were used to guide the first phase of coding. However, as the participants’ testimonies deepened, *emic* categories emerged that reflected their own experiences and perceptions, such as the importance of “feeling recognised” or “flexibility in support”. The constant interaction between the two approaches made it possible to refine the initial categories and build a richer and more contextualised framework of analysis. Thus, successive readings were carried out to compare and agree on the identified categories (Bryman, 2012), and reliability was enhanced through intercoder agreement tests among the researchers themselves.

This process of triangulation between theory and participants’ voices strengthened the validity of the findings and contributed to a deeper understanding of socio-educational dynamics in Basic VET.

Limitations

Although this study provides valuable information on socio-educational experiences and strategies in Basic VET within the specific context of the Basque Country, there are certain limitations when it comes to generalising the results directly to other contexts. At the outset, it should be noted that in the qualitative approach, the sample is not necessarily defined in terms of statistical representativeness but rather as a strategic selection of participants or informants who can provide valuable insights and richness to the data (Patton, 2015). Therefore, the findings of this study should be interpreted within the limits of its specific context and with caution when extrapolating them to other educational settings. Factors such as regional education policies, the socio-economic characteristics of the student population, and the cultural particularities of each educational institution may influence the implementation and outcomes of socio-educational strategies.

In future research, it would be beneficial to explore the possibility of using probability samples that allow for greater generalisation of the results. Similarly, comparative studies between different regions or countries could provide richer insights by identifying similarities and differences in socio-educational practices and their impact on Basic VET students.

Despite these limitations, this study contributes valuable and in-depth knowledge on effective socio-educational strategies within the context of Basic VET in the Basque Country, which was the focus of the research funding, and can serve as a basis for developing more informed educational interventions and policies.

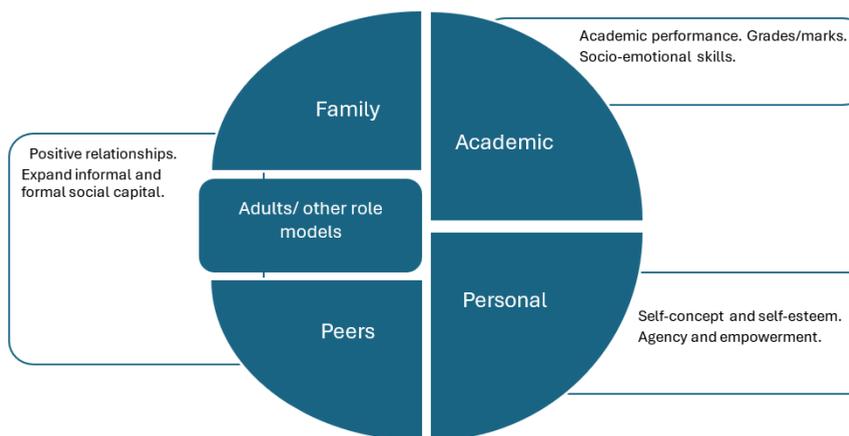
Results

This section is divided into two parts: benefits and socio-educational strategies conducive to achieving these benefits.

Benefits Derived from the Training Experience in Basic VET Centres

The analysis of the testimonies of the different groups, namely, the students, their families, the teaching staff, and leadership teams, point to the fact that socio-educational intervention in this context goes beyond improving academic performance. They highlight four major areas that, following the systems theory (Bronfenbrenner, 1992), are mutually reinforcing: academic, personal, reference adults, peers, and family. It is therefore regarded as a multidimensional, multifaceted, and holistic field of socio-educational intervention (Aramendi et al., 2022; Aramendi & Etxebarria, 2021; Echeita, 2019).

FIGURE I. Benefits derived from the training experience in Basic VET centres



Source: Compiled by the authors

In terms of academic benefits, while there is a debate about whether the demands are the same in comparison with formal education, it is widely agreed that grades/marks improve. Moreover, beyond the quantitative assessment itself, students gain socio-emotional skills that improve not only their technical level, but also school dynamics and the teaching-learning process (Sánchez-Bolívar et al., 2023). At the same time, objectively, it is observed that they begin to pass subjects and obtain high marks, which seems to posi-

tively influence their self-perception as students.

“I saw that my teachers were happy with me, something I never experienced at school. There, they marginalised you because you didn't know and were more concerned with the intelligent ones. When I saw that the teachers were pleased with me, I also felt happy, especially because of the marks I got, which I never thought I could get.” (AL_BIZI.)

However, in addition to academic benefits, all the groups, notably students and families, underline the personal impact. They are struck by the way in which the group of educators positions itself in relation to the group of students and their realities. When exploring the underlying reasons, the discourses reveal essential factors that contribute to a perceived improvement at a personal and systemic level. These include administrative irregularities, family and/or peer conflicts, as well as problems related to substance abuse and other addictions. The responses observed are adjusted to the students' needs, taking into account the systems that interact in their lives. What they highlight most is their feeling of “becoming more mature”, in the sense of promoting development of agency (“I am capable, I have resources, and if I do not, I am capable of looking for alternatives”), participation, and empowerment (“my opinion matters, as do my actions, and my actions can have an impact at the community level”), consequently leading to greater well-being during a vulnerable and formative stage of life (Piñero et al., 2024).

“I can see that she's happy and that she's evolving and collaborating. It's been a total transformative change.” (FAM_ARA1.)

“They not only teach you to be smart in mathematics, but also in things that can be used more in everyday life, like respect and empathy” (AL_BIZI.)

The group of Basic VET students largely come from contexts where school authority figures in hierarchical positions, through their discourse and behaviour, assigned them negative *labels*, either for disruptive behaviour or, to a lesser extent, for academic difficulties. This label had a direct negative impact on their relationship with adults and peers. Within the context of Basic VET, there is an opportunity to turn this scenario around, allowing them to break away from the relationship patterns they have with adults. As for their relationships with their peers, they are of similar ages and come from similar backgrounds; however, these characteristics are not seen as something nega-

tive, but instead, time and space are provided so that these individuals can get to know one another through a positive lens. The dynamics generated at the centre foster interaction and the ability to share in ways that differ from their previous experiences, taking the relationship beyond the educational sphere. Thus, they are being given the chance to expand their social capital, both through formal relationships with the centre's professional team and through informal interactions with their peers.

“Here, almost everyone is my age. When I repeated a year, I was with classmates two years younger, and we didn't have much in common. I didn't meet up with them at the weekend, but I do here.” (AL_ARA1.)

“People here are very different. Being in the same centre studying the same thing, which is something you have chosen, means you can have something in common with the rest of your classmates.” (AL_ARA1.)

Similarly, family relationships tend to improve, which could be attributed to the positive feelings perceived in the aforementioned systems; they feel “less on guard” and “safer”, due to the two-way relationship created by the school, marked by closeness, flexibility, accessibility and opportunities for involvement. The family's own support, and the support of their peers, foster students' self-concept, improving their academic performance and well-being (Ramos-Diaz et al., 2016).

“In secondary school, when you got home, your parents would be silent or worried because you were doing badly. Now that worry is gone, things are better at home and, overall, so is everything else.” (AL_ARA3.)

“I no longer have to argue with him at home about anything. In the past, he didn't even want to study, and there were problems, what with the computer and everything; we even took him to a psychologist to help us with how to...” (FA_ARA2.)

Acknowledging the idea that well-designed and well-organised Basic VET is a guarantee of social and labour market insertion (Aramendi et al., 2018) for an at-risk group that could end up increasing the percentage of the population with difficulties and even the number of people at risk of social exclusion, brings to the fore the need to delve deeper into the successful socio-educational methodologies, methods, and strategies being implemented on a daily basis by professionals in their centres and the community. How are

the previously mentioned benefits achieved? In other words, what underlies the success of this model?

Socio-educational strategies to promote protective educational spaces

This research is grounded in the approach that citizenship, both the experience and construction of it, which is a holistic experience, understood as an educational process that accompanies individuals throughout their life course, encompasses formal, non-formal, and informal education, transcending the standardised and formal curriculum (Gil-Jaurena et al., 2016). Today, although we are witnessing a neoliberal wave across the globe, international organisations such as the United Nations and the Council of Europe continue to advocate for democratic societies. This approach to fairer and more democratic societies draws on the Aristotelian conception of the individual as a free and autonomous citizen, freedom being the fundamental principle of democracy. Based on Arendt's thesis on freedom and responsibility (Arendt, 1997), in which both are deemed essential aspects to the human condition, it seems pertinent to consider the appropriateness of the concept *flexibility* (present in current legislation), especially if the objective is to encourage, motivate, and guide learners' cognitive agency on the road to freedom. In other words, flexibility makes it possible to redefine the educational experience.

“What always comes first is a rupture with what they've experienced up until then in their education.” (FOCUS_P_BIZI.)

“We don't consider education solely as something academic, but rather as a process in which we accompany these young people in all the vital stages they are going through in their lives. Because we are aware that if we don't offer some support regarding their environment and the reality that affects them, their performance and the training process itself will likely take a backseat in terms of importance for them. A global vision is essential and one that has been studied and analysed by the team, to guide us in navigating these processes, as we mustn't get lost in them. Ultimately, it's not the objective, but the process itself that we have to support.” (D1.)

Engagement is part of a process related to factors such as interest in the subject and decision-making capacity. The starting point can be found in the curricular structure defined by legislation. Specifically, in the composition of theoretical class hours and practical class hours, the latter of which is carried out through workshops where they develop and improve the skills necessary for entering the labour market. This particular structure is highly valued by all the agents in the focus groups as it fosters an intrinsic motivation to participate because they find meaning in what they do and feel useful. From a pedagogical point of view, this resource is used as a way of creating a link with the theoretical classes, both in terms of content and training to develop responsibility. They are thus committed to the comprehensive development of students (Aramendi & Etxebarria, 2021), with the goal of increasing the personal and social resources needed to succeed in society.

“I wake up happy because I have a workshop, otherwise I wouldn’t even come to class. At secondary school, I didn’t feel like getting up and I’d go in without wanting to. It made me lazy.” (AL_ARA3.)

“Being able to coordinate effectively with the rest of the educational team (...) I go down to the boat workshop and I ask them, ‘Hey, what are you doing?’ And then we think about what we’re going to do in maths to reinforce this, and we work on a shared project... They see that what they learned in the classroom is also relevant in the workshop, and therefore, it will be significant when applied in practical settings and later on, in real life.” (FOCUS_P_BIZ1.)

There is also an emotional component mediated by the desire to belong to a group (Pahl, 2019). Upon entering the classroom, the teacher disregards the classic structure. The first step is to ignite and sustain the students’ motivation, which they do through emotional connection and bonding. By implementing this strategy, they seek to create a meeting space where individuals feel comfortable, allowing relationships of trust to be built among peers and with adults, which is crucial for participation and engagement (Fonseca & Maiztegui-Oñate, 2017). In terms of content, although they have a curriculum that serves as a guideline, it is not the primary focus; instead, they first take into account the interests of the group through symbolic and critical paradigms, collaboratively building from that base. In this process, the closer

they get to the students' realities, the greater their success.

“ Sometimes you walk in, and you start talking because you see there are conversations going on, you hear people talking, and from those conversations, you end up steering them towards the work you have to do. The reason for motivation is more personal and emotional rather than academic.” (FOCUS_P_BIZ2.)

Interest in the subject, motivation to attend, and continued engagement with the centre primarily depends on the willingness of the teaching staff to build an ongoing relationship, where the task itself is not the final objective, but rather respecting a student's time, listening, and proposing any topics without judgement are prioritised (Fonseca, et al., 2023). This approach involves personal and individualised support for learning, where educators conduct diagnostic assessments (through tutorials, observation, and coordination) to enhance the skills of each student.

“I tell the teacher, and she makes an effort. I can see her willingness to explain things to me, and if I don't succeed, she'll try again and will explain until I understand.” (AL_GIP1.)

“Once I've got you interested and established a bond, I have to challenge you. But I have to know how far I can push you because some break under such pressure, while others can be pushed harder. But that's where you have to adapt to each one. You have to have a very large antenna.” (DI)

The intervention also includes a community component. In the learning spaces, students are positioned as sources of knowledge, with collaborative methodologies employed so that the experience is shared, and participation is put into practice through actions that allow them to have a voice. In this way, the true act of teaching, as advocated by Freire (2010), is approached, where the act of apprehending the content or cognitive object requires a prior or simultaneous process, with which the learner also becomes a producer of the knowledge that was taught (p.143).

“That they cooperate with each other, that they change a bit the image they've had of a teacher until now and that it's good for them to feel they can relate to what is being asked of them. What we're saying is relevant for them at a personal and educational level, fostering a sense of closeness that they've not had until now.” (FOCUS_P_BIZ1.)

“I’ve always been in schools where all the students were native. And when I came here, there were people from all over the world, and I learned more about cultures than in history classes.” (AL_BIZ2.)

While it is true that knowledge is assessed in the same way as in secondary education, it seems that the level of rigour is lower, placing greater emphasis on other acquired skills. This type of assessment has led to controversy among professionals. For some, this “discredits” the Basic VET model. For others, and in line with the findings of Sureda-García, et al. (2021), the fact of focusing less on their weaker competences and prioritising others, encouraging and guiding them on what to do and how to develop the desired skills, facilitates the attainment of valuable behavioural, attitudinal, and cognitive outcomes.

“Attendance is also really important here, as well as exam assessment and everything related to marks. It’s not that they relax here, but they are given more freedom, and this freedom helps them to be more responsible.” (FA_ARA2.)

Coordination between the educational team and the support provided by the leadership team is a key strategy to ensure that the idea of flexibility does not equate to “loss of control”. In fact, flexibility is more aligned with authority than with a lack of authoritarianism since, from a horizontal position, it seeks to accompany, guide, and draw out students’ inner capacities, encouraging them towards their fulfilment (Viniestra-Velázquez, 2021). Furthermore, it involves consistent accompaniment through appropriate guidance, general support, positive messages, and setting boundaries, if necessary, which fosters not only a sense of psychological and emotional security but also a respectful and welcoming environment based on relationships of trust and support (Fonseca et al., 2023). Firstly, adults serve as a guarantee of protection, taking care of them, watching over them, and ensuring that possible problems that may arise between peers are solved peacefully. In terms of emotional security, the students point out that it is a space where they can be themselves without fearing the reaction of adults and peers. These are processes where students put themselves to the test, assessing the reach of educators, within a preconceived framework of their relationships with key adult figures. The process, the duration of which can be longer or shorter de-

pending on the students' background, takes on a more "peaceful" aura when they encounter responses that are different from what they are used to. They become aware of their new relationship, feeling that "they are not enemies", and that they will not be abandoned, allowing them to break free from old patterns. They mention the feeling of tranquillity when they work on personal or social aspects because they feel that they are listened to and respected. This study supports findings from previous research (Salvà et al., 2024) that illustrates that communication, emotional support, and the bond between teachers and students, characterised by these positive, close interactions and what is referred to as *being*, boosts confidence, commitment, and perseverance in students, while also fostering positive peer relationships and greater acceptance among their classmates (Sureda-García et al., 2021).

"It's important to establish a connection, and you need many personal characteristics, like empathy, listening skills, and patience, to be able to say, 'Look, you've judged me, and I've judged you. But I'm here, and let's see what happens.' We have to have people with a very specific profile, and not everyone has to be like that." (D2.)

Creating environments in which individuals can engage and take part, within a context of clearly established rules and boundaries, while fostering horizontal relationships, allows others to feel they are part of something (Fonseca et al., 2023).

"They put up with a lot from me. The first year was very difficult for me here. I found it hard to focus, although now people see me as being very focused. I had a few bad experiences with some teachers last year, really bad, and in the end, you learn that you can't behave that. But it isn't like in secondary school where because of one incident, you leave and that's it, you never come back and set foot in the school again. That doesn't happen here at all. Here, we talk about the problem, and they help you solve it. The first thing they ask you is, 'What's wrong? Are you okay? Is something going on—something personal?' They know that there's something behind it. And in the end, it impacts you because it's very different from all the other schools and that's cool, to be treated like this." (AL_GIP2.)

Providing support and accompaniment on a daily basis can lead to personal satisfaction if successful processes are eventually seen. However,

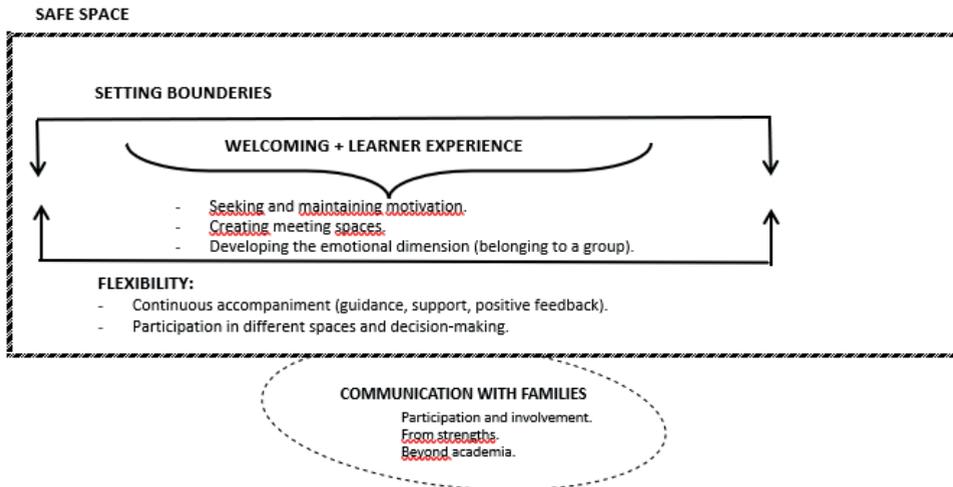
throughout this process, the narratives of the group of educators and the leadership team underline difficulties and problems that directly impact the psycho-emotional well-being of the professionals. Similar findings were reported by Fix et al. (2020), pointing out that teachers' own involvement evokes strong emotions such as satisfaction and pride, but also frustration and doubt, which may trigger burnout, as the sustainability of their performance influences their well-being and emotions. This situation is further aggravated if we take into account the legal and administrative requirements to be hired in this field: some teachers have a high level of technical qualifications, yet are *pedagogical novices* (Gagnon & Dubeau, 2023), i.e., they lack specific training in socio-psycho-pedagogical areas, which could leave them unprepared to meet the needs of Basic VET students, resulting in a more frustrating and adverse situation for these professionals.

“A person who doesn't have much drive or isn't very strong mentally..., basically, it depends on the group they are in; I would say that psychologically, they may not be able to stand it much longer in Basic VET.” (FOCUS_P_BIZ2.)

“Teachers and educators have a responsibility that is often not recognised, and many times, we aren't even aware of it.” (D1.)

The set of strategies analysed so far gives a glimpse of a safe environment, characterised by a combination of a welcoming approach, flexibility, and boundaries (Figure II). Such an environment allows students to reintegrate into their educational pathway, leaving behind the negative experiences and obstacles they had previously encountered.

FIGURE II. Socio-Educational Strategies to Promote Safe Educational Spaces



Source: Compiled by the authors

Voluntary identification with the group and the environment leads to assuming responsibilities (Fonseca et al., 2023). Previous studies show how the active participation of students positively influences learning processes and academic success, acting as a protective factor against early school leaving. In turn, this type of support is reminiscent of an intervention based on the capabilities approach (Sen, 2000): one that is centred on agency, by acting or exerting influence and power in a given situation; centred on competence, by developing new skills and being appreciated for the talent one has or has acquired; and centred on belonging, by developing meaningful relationships with peers and teachers, giving them an active role in the school.

“That you don’t give up so easily, and that you can do it. I mean, sometimes you think you can’t do it, don’t you? And if you give up and say, ‘I can’t do this anymore, I’m not capable of doing this.’ All the teachers say, ‘I know you’re capable’, and they give you a little pep talk.” (AL_GIP1.)

The educational teams are aware that their intervention in the centre will be more successful if they get the external environment involved, generating a butterfly effect by setting in motion mechanisms that, with the

proper support, start to fit together. Thus, communication with families is another fundamental strategy in the socio-educational process (Figure II), aimed at improving interactions and coexistence (Sureda-García et al., 2021). The families and the group of students value the ongoing contact positively, without perceiving any kind of negative judgement or fear when it comes to communication between their educational reference figures.

“Knowing whether that boy or girl has arrived well and whether they’ve been at home, whether they’re evolving... It’s an ongoing dialogue with the families, isn’t it? They tell us, “No other centre calls us so often.” (D2.)

What makes this communication successful is the approach taken to foster it. Family members feel that they are not only listened to but also actively sought out and invited to join in, to get involved and take part in the process. This type of listening goes beyond academic situations and also addresses the family’s own needs (sometimes explicitly, other times implicitly) through guidance sessions (face-to-face or by telephone) or referrals.

“They don’t just focus on how we are at school (...) they also talk about if you have problems with your family, and if needed, they get the family together; in other words, they act as psychologists as well as teachers and classmates. I mean, they make you feel good.” (AL_GIP2)

Moreover, the relationship is established from the point of view of strengths rather than from a perspective centred on “deficit”. This seems to be what makes the difference. According to the testimonies, prior to entering Basic VET, most of the families experienced a profound sense of hopelessness because of their children’s behaviour, the messages received from the educational figures, and their own feelings of inadequacy and guilt as parents. But they were surprised to find another profile among the teaching staff at Basic VET, who invited them to become involved in a socio-educational process based on respect and on communicating positive feedback, both about their children and about themselves. In essence, this approach to family education allows families to rebuild their self-concept and to re-conceptualise their role as educational agents in collaboration with the centre. They begin to change the image they have of their children, leading to a more amicable way of relating to each other. Their sons and daughters perceive this shift, and the Pygmalion effect is redirected towards a focus on goals and achievements.

“Maybe it’s me who isn’t bringing him up properly, so if there’s a mistake on my part, I want them to tell me and I’ll correct it. If the mistake lies with him, then tell him, and between the two of us, we can try to solve the problem (...) So yes, changing the centre has helped us.” (FA_ARA2.)

“I often felt very scared when I was at secondary school because my mother used to say to me, ‘They called me from your school’ and I always expected something bad because it was always like that. Your son has done this and so on, and so I was always afraid. Here my mother says, ‘They called me from school’, I get home and it’s something nice. And you say ‘wow’ and it gives you a rush. You feel prouder, and even more motivated to work and to continue like that.” (AL_GIP2.)

Conclusions

This article has identified the benefits derived from the student experience in Basic VET and analysed the socio-educational strategies that make such benefits possible. The findings demonstrate how Basic VET centres can be structured around concrete practices, with adults playing a fundamental role in creating environments where students and their families feel protected and welcomed. This is especially crucial for those students in the Spanish education system who experience high levels of school failure and, in some cases, behavioural problems (Hernangómez & García, 2023). These centres appear to be more than merely instruments for obtaining the basic skills needed to enter the labour market; they also serve as spaces for coexistence and education, in its broadest sense, where students have the chance to redefine their educational experience, becoming a person with a better self-concept and full capacities for inclusion and comprehensive development within society.

These are spaces for coexistence where teachers who are actively involved support students and have an impact on their socio-educational competences. This path is also shared with the families, making them accomplices in the socio-educational process, offering them an image of their children that

differs from the one given at school, as well as insights and spaces to relearn how to interact with them. It is about teachers who constantly question their practice, who *rethink* established ideas, and seek refuge in pedagogies of *care* and *hope*, promoting dignity and humanity. Such a reality can only happen when teachers embrace a different disposition in the way they look at *the other*. These teachers do not regard the group of students as *nobodies*; they do not adopt a position in the relationship of *I speak TO the learner*, but they *see them, find them, are present, speak WITH them*. From there, they *rebuild*. And despite the challenges they may face in the process (especially of an emotional nature), they remain steadfast in favour of justice, freedom, and the right to be. We believe that it is only in this way that schools can *embrace* the legacy of being a potentially influential figure in the life trajectories of individuals. This leads to a very interesting debate on citizenship and education, especially because the reflections are informed by an analysis and comparison with reality (Fonseca et al., 2023).

In light of the fact that teachers should be trained in pedagogical strategies that accompany students in the socio-educational process, a greater emphasis needs to be placed on developing inclusive pedagogical skills, beyond the aforementioned mere teaching of content, focusing on teachers' pedagogical practices with students (Miesera & Gebhardt, 2018). In the case of the Basque Country, there are authors (Aramendi & Etxebarria, 2021) who underscore the importance of improved teacher training for professional development in this area, given the demands of the current context of a diverse student body with risk factors; an educational challenge that merits future research. Addressing these issues allows us to create socio-educational intervention models that foster high standards of professional performance and support the emotional well-being of those working in the field. The findings of this research could play a key role in contributing to the training of future education professionals, particularly in the area of Basic VET.

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Key Predictors of School Dropout in Paraguay: A Big Data Analysis

Predictores clave del abandono escolar en Paraguay: Un análisis de datos masivos

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Abstract

School dropout constitutes a structural challenge in Latin America, carrying profound implications for social and economic development. This study examines the factors associated with school dropout in the years preceding the completion of secondary education (known in Paraguay as Educación Media), utilising administrative data from the Registro Unico del Estudiante (RUE), the educational data management system of the Ministry of Education and Science, for the period 2017-2023. A quantitative approach was employed, encompassing descriptive analyses and the application of machine learning models to identify dropout patterns and predict dropout risk. The study analyzed 706,785 student records, incorporating sociodemographic, academic, and institutional variables. The findings indicate a significant increase in dropout rates between 2019 and 2020, coinciding with the onset of the COVID-19 pandemic, with notable differences observed across gender, educational pathway, and geographic location, where grade overage and grade repetition emerged as critical determinants of dropout. Students enrolled in night shift and vocational training programs exhibited the highest dropout rates. In predictive terms, LASSO regression demonstrated the best performance, achieving an optimal balance between precision and sensitivity in identifying at-risk students. These results highlight the importance of leveraging extensive data analysis and advanced modelling techniques to strengthen school retention policies and develop evidence-based early intervention strategies. However, challenges remain concerning the quality and comprehensiveness of educational data, the need to explore emerging artificial intelligence methodologies, and the integration of psychosocial and economic factors to achieve a holistic understanding of school dropout and its determinants.

Key words: Dropouts, Secondary Education, Socioeconomic Background, Data Science, Predictor Variables.

Resumen

El abandono escolar es un problema estructural en América Latina con profundas implicaciones en el desarrollo social y económico. Este estudio analiza los factores asociados al abandono escolar en los años previos a la finalización de la educación secundaria (denominada Educación Media en Paraguay), utilizando datos administrativos del Registro Único del Estudiante (RUE), el sistema de gestión de datos educativos del Ministerio de Educación y Ciencias, durante el período 2017-2023. A través de un enfoque cuantitativo, se realizaron análisis descriptivos y se aplicaron modelos de aprendizaje automático con el objetivo de identificar patrones de abandono escolar y predecir su riesgo. Se examinaron 706.785 registros estudiantiles, considerando variables sociodemográficas, académicas e institucionales. Los resultados evidenciaron un incremento en las tasas de deserción entre 2019 y 2020, coincidiendo con el impacto de la pandemia de COVID-19. Se observaron diferencias significativas según género, especialidad educativa y ubicación geográfica, identificándose la sobriedad y la repetición como factores críticos del abandono escolar. Los estudiantes matri-

culados en el turno nocturno y en programas de formación profesional presentaron las tasas de deserción más elevadas. En términos predictivos, la regresión LASSO mostró el mejor desempeño, logrando un equilibrio óptimo entre precisión y sensibilidad en la identificación de estudiantes en riesgo. Estos hallazgos subrayan la importancia del análisis de datos masivos y la aplicación de modelos avanzados para fortalecer las políticas de retención escolar y diseñar estrategias de intervención temprana basadas en evidencia. No obstante, persisten desafíos relacionados con la calidad y cobertura de los datos educativos, la necesidad de explorar metodologías emergentes de inteligencia artificial e integrar factores psicosociales y económicos para una comprensión integral de la deserción escolar y sus determinantes.

Palabras clave: Abandono escolar, Educación secundaria, Nivel socioeconómico, Ciencia y análisis de datos, Predictores.

Introduction

Dropping out of school (also called early school leaving or student dropout) is a complex phenomenon that significantly impacts educational and social development (Zengin, 2021). Globally, millions of students discontinue their studies every year, posing challenges for sustainable development. In Latin America, school dropout rates exceed 30% in some countries, with 41.4% of the working-age population over 15 not completing secondary school (Economic Commission for Latin America and the Caribbean [ECLAC], 2024), a situation exacerbated by the pandemic. In contrast, the European Union has reduced dropout to 9.5 per cent by 2024, although Spain still reports 13 per cent (Eurostat, 2025).

In Paraguay, school dropout has received increasing attention, especially within the framework of the policies of the Ministry of Education and Science (MEC). According to the 2023 Permanent Continuous Household Survey of the National Institute of Statistics (INE, 2024), 98.1% of the population aged 10–14 attended an educational institution, a figure that drops to 71.4% in the 15–19 age group, with lower levels in rural areas (65.5%) compared to urban areas (75.2%).

This study focuses on school dropout during the years prior to the completion of secondary education, a critical stage for human capital development and preparation for the labour market and civic participation. Dropping out at this level has long-lasting consequences: at the individual level, it

is associated with higher unemployment rates and lower-quality employment, while at the societal level it perpetuates cycles of poverty and inequality.

The increasing availability of big data and advances in machine learning techniques have proven to be effective tools for predicting dropout and academic performance (Krüger et al., 2023). However, in Latin America, studies evaluating these technologies at pre-tertiary levels are scarce (Rodríguez et al., 2023; Smith and Gutiérrez, 2022), and infrastructure and data quality remain challenges (Hernández-Leal et al., 2021).

Currently, Education Management Information Systems (EMIS) play a crucial role in academic monitoring and data-informed decision-making, although they face challenges of interoperability, quality, and coverage (Arias et al., 2021). Leveraging this massive data offers an opportunity to improve the efficiency of education policies.

In Paraguay, the Registro Único del Estudiante (RUE) is the main data management tool of the education system, developed by the MEC. This relational database, operational since 2017, uniquely identifies each student and tracks their academic trajectory, integrating variables such as academic history, family data, and socio-economic conditions (INE, 2024), although it has limitations in contextual variables.

This study aims to analyse dropout patterns in secondary education (known as Educación Media in Paraguay) using data from the RUE during the period 2017–2023. The following questions are posed: What are the main dropout patterns in secondary education in Paraguay? What sociodemographic and institutional variables critically affect dropout? What analytical and predictive techniques offer the greatest capacity for early identification of at-risk students?

The answer to these questions will generate an evidence-based diagnosis to strengthen school retention policies in Paraguay and contribute to the global debate on reducing educational inequality, providing comparable inputs for other countries and promoting the use of large-scale data in the improvement of education systems and in the formulation of inclusive strategies to ensure student access and retention.

Theoretical Framework

Dropping out of secondary education is a complex phenomenon affecting Latin America and Europe, with social, economic, and cultural implications. Despite some progress, it remains a challenge for both regions (ECLAC,

2024; European Education Area, 2022). It is defined as early school leaving before completing secondary education—a stage which, in Spain, corresponds mainly to post-compulsory education—limiting future prospects and reinforcing cycles of poverty and exclusion. Its explanatory factors are multiple and cumulative, so its prevention requires sustained and personalised interventions depending on the degree of student vulnerability (Khurram et al., 2023; Hernández & Alcaraz, 2018). Ramsdal and Wynn (2022) recommend positive psychology and collaborative work to prevent it, while Nait (2021) highlights the considerable effort required in rural areas.

Explanatory factors for school dropout

Poverty is one of the most relevant factors in Latin America: many students have to drop out of school to work and support their families. In Paraguay, more than 66 per cent of those who drop out do so for economic reasons. Child labour is also prevalent, affecting attendance and performance in children and adolescents. Similar challenges exist in Europe, but social protection systems have helped to mitigate them. Still, in countries such as Spain, the dropout rate reaches 13% in 2024 (Ministry of Education, Vocational Training and Sport [MEFPD], 2025).

Low academic performance and the lack of effective instructional methodologies are another determining factor. In Latin America, outdated curricula and a disconnection from students' realities lead to demotivation, as they do not respond to their interests, vocations, or cultural contexts. In several countries in the region, including Paraguay, more than half of the 15-year-old population does not reach the minimum level of mathematical problem-solving proficiency (United Nations Educational, Scientific and Cultural Organization [UNESCO], 2022, p. 92).

The family and social environment also has an impact on school dropout. In Latin America, factors such as teenage pregnancy, relationships at an early age, poverty, and child labour significantly affect school retention, especially among adolescent girls. In addition, school dropout is higher among Indigenous and Afro-descendant youth (ECLAC, 2024). In Europe, however, comprehensive sex education has reduced dropout due to pregnancy, except in some migrant communities (European Education Area, 2022).

Institutional characteristics also play a role. In Latin America, significant infrastructure deficits and digital divides persist. In Paraguay, less than 50% of secondary schools have connectivity for pedagogical purposes

(UNESCO, 2022, p. 80). This, coupled with the gap between state-funded and private education, favours the latter, with lower dropout rates. Although Europe presents more favourable conditions, disparities between countries and regions persist (Eurostat, 2025).

Consequences of dropping out of school

At the individual level, not completing secondary education limits the possibilities of accessing quality jobs and perpetuates conditions of poverty and exclusion. In Latin America, dropping out of school is linked to child labour and early entry into the informal labour market, which affects the right to quality education and reduces opportunities to exercise full citizenship (ECLAC, 2024).

At the social level, dropping out of school deepens structural inequalities and reinforces the intergenerational cycle of poverty reproduction. In Latin America, while 85% of young people in the highest income quintile complete secondary education, only 44% in the poorest quintile do so (UNESCO, 2022, p. 17). This gap has a direct impact on access to opportunities and places greater demands on social welfare and protection systems, increasing the demand for public support (ECLAC, 2024).

From an economic perspective, early school leaving undermines countries' productivity and competitiveness. According to ECLAC (2024), each extra year of schooling raises incomes by 7–10%. At the macro level, countries with high dropout rates have lower GDP growth; reducing it by 10% could increase GDP by 0.5% per year. Secondary education provides essential skills to access skilled jobs; those who drop out have fewer opportunities in the formal market, entering precarious and low-paid jobs. In Paraguay, around 60% of young people who drop out of secondary education come from households linked to informal economic activities (Ministry of Education and Science [MEC], 2013, p. 61). While economic growth in Latin America is constrained by high non-regulated labour, in Europe, where school dropout rates are lower, economies have developed technology-based and knowledge-driven sectors (European Education Area, 2022).

Massive data on school dropout studies

The use of big data in education boosts dropout detection and prevention by processing large volumes of data in real time (Amaya-Amaya et al., 2020). Dropout is often preceded by absenteeism or grade repetition (Montero-Sie-

burth & Turcatti, 2022; Ajjawi et al., 2020). In this regard, the data analytics approach, machine learning techniques, and educational data mining (Flores, 2025; Serrano et al., 2024) have proven effective in detecting dropout, and their accuracy depends on the quality and diversity of the variables (Kocsis & Molnár, 2024).

Variables explaining dropout span personal, socio-economic, academic, and institutional domains (Alyahyan & Düşteğör, 2020; Alladatin et al., 2023), and no single factor is decisive. Gutiérrez-de-Rozas et al. (2023) highlight academic-vocational orientation and personal aspects as triggers, while Zapata-Medina et al. (2024) and others find that academic variables tend to be the most predictive (Segura et al., 2022; Ortiz-Lozano et al., 2023). In Paraguay, Insrán-Coronel et al. (2024) identify the critical role of poverty and child labour. Similarly, Abideen et al. (2023), together with Venkatesan and Mappillairaju (2023), corroborate the importance of data mining techniques to locate high-incidence areas, guiding more effective interventions.

Currently, most studies on big data and predictive models of dropout focus on higher education, with a significant gap regarding their implementation at earlier educational levels (Rodríguez et al., 2023; Smith & Gutiérrez, 2022). Ensemble methods, such as Random Forest, stand out for their predictive efficiency, while techniques such as logistic regression continue to be used for their interpretability. More complex models, such as neural networks, are less common (Venkatesan & Mappillairaju, 2023). In Latin America, the lack of structured and accessible data still limits their implementation, along with technological, quality, and coverage-related constraints (Hernández-Leal et al., 2021; Arias et al., 2021).

Method

Source of data

The data come from the Registro Único del Estudiante (RUE), administered by the Ministry of Education and Science (MEC) of Paraguay. The RUE consolidates information on the educational trajectories of students at the national level, facilitating the analysis of factors related to school retention and graduation. Institutions report periodically to the MEC, and this information

is integrated with other official databases to improve its accuracy (INE, 2024).

This study focuses on 706,785 students in Secondary Education in Paraguay, distributed across 9,051 institutions, covering various pathways. The dataset includes sociodemographic, institutional, and academic variables. For 2017, contextual variables related to health, family environment, housing, and socio-economic conditions are also available, although with some reporting limitations. In subsequent years, the capture of these variables was not systematically maintained, making 2017 the only cohort with contextual information, which motivates the focus of the analysis on that period.

The database, in relational format, was managed with PostgreSQL, which ensures data integrity and efficiency in handling large volumes of information. At no point was data accessed that would allow the nominal identification of students (e.g. names or ID numbers), thus ensuring confidentiality.

Data processing

A general review of the internal consistency of the data was carried out, identifying contradictory, duplicate, or systematically erroneous records. Based on this, data cleaning and standardisation procedures were applied to resolve conflicts and eliminate non-representative values. The relevance of each variable in relation to the dropout phenomenon was also assessed, excluding those that showed no clear association or presented inconsistent reporting, in order to maximise analytical quality and minimise potential bias.

The construction of derived variables was based on the longitudinal tracking of students. Dropout was defined as students who, after their last recorded enrolment (between 2017 and 2021), neither graduated nor re-enrolled for at least two consecutive years. Conversely, school completion was defined as students reaching the final year of their educational phase without further enrolments. These operational definitions were essential for the subsequent analysis.

Focus of the study

This paper adopts a quantitative approach, combining a descriptive analysis of school dropout—exploring frequencies and rates segmented by sociodemographic, institutional, and temporal variables—and predictive modelling using machine learning techniques to estimate the probability of dropout, considering student-level, institutional, and socio-economic information.

The descriptive analysis aimed to characterise the study population and examine dropout distribution by sociodemographic, institutional, and geographic variables. Frequencies and dropout rates disaggregated by gender, area, type of institution, and educational modality were estimated and are presented in tables, charts, and maps. This initial exploration enabled the identification of the main dropout patterns in Paraguayan secondary education and served as the foundation for the subsequent analytical stages.

The predictive component focused on a cohort of students who began the first year of Secondary Education in Paraguay in 2017, aiming to assess the factors influencing non-completion of this educational level. After pre-processing and cleaning the dataset, a rigorous feature selection process was conducted and several predictive models were implemented. The procedures, models, and techniques used are described in detail in the following section.

Case Study: 2017 Cohort

A cohort of students entering the first year of Secondary Education in Paraguay in 2017 was analysed to assess the factors associated with school dropout and to examine the academic trajectory of the students. The target variable, called “dropout”, is defined based on the discontinuation of enrolment after initial registration, allowing for a clear identification of those students who do not continue in the system. The dataset integrates variables from different categories, such as demographic characteristics (gender, age and overage), academic background (repeated courses, type of educational pathway and school shift — session timing), institutional attributes (type of management and geographical location), socio-economic indicators (educational level and occupation of parents or guardians, household characteristics), and aspects related to access and mobility (travel time and means of transport used to reach school).

The first step in the analytical process was to carry out an exploratory analysis to identify variables with high percentages of missing data. Those variables with high levels of incompleteness were eliminated, given their limited reliability to contribute to the analysis. As for the individual records, the initial dataset contained 87,361 observations, which were cleaned by applying successive elimination thresholds for missing values. Starting with a threshold of 80% and progressively reducing it to complete records (0% missing data), a final dataset of 63,290 observations was obtained. During this

process, a balance was maintained in the “dropout” variable (between 15% and 12% dropout), which supports the representativeness of the sample and ensures its suitability for the implementation of analytical models.

Institutional identifiers were excluded from the analysis after confirming that this decision did not affect the performance of the predictive models. Although an intraclass correlation coefficient (ICC) of approximately 33% was found—indicating that a considerable portion of the variability in dropout was attributable to differences between institutions—their exclusion prevents the models from overfitting to specific patterns and enhances their generalisability to new contexts. Additionally, given the marked imbalance in the “dropout” variable, an undersampling technique was applied to the majority class prior to model training to ensure an adequate balance with the minority class, thereby preserving the representativeness of critical instances.

Feature Selection

Proper feature selection is essential to reduce overfitting, ensuring that the model captures generalisable and relevant patterns rather than memorising dataset-specific noise. To robustly identify the most informative variables for predicting early school leaving, several feature selection techniques were employed, ensuring that the selection process was grounded in diverse and robust criteria.

First, the Random Forest method was used, applying two importance metrics: Mean Decrease Accuracy (MDA) and Mean Decrease Gini (MDG). These indicators assess the direct contribution of each variable to the predictive power of the model, either by measuring the drop in accuracy when their values are permuted or by evaluating the reduction in node impurity. In parallel, Logistic Regression was applied, which, by estimating the relationship between independent variables and the probability of dropout, yields interpretable coefficients and facilitates the identification of significant predictors. Additionally, LASSO Regression was used, incorporating an L1 regularisation penalty to shrink the coefficients of less relevant variables to zero, thus reducing overfitting and improving model generalisation.

Predictive Models of School Dropout

With the selected variables, several classification algorithms were implemented to evaluate their predictive capacity in identifying school dropout, in-

cluding linear models, tree-based approaches, and classical machine learning techniques. Prior to model training, a review and tuning of hyperparameters was conducted to optimise performance.

Logistic Regression was used as the baseline model due to its high interpretability. The coefficients estimated via maximum likelihood enable the computation of odds ratios, facilitating the evaluation of each predictor's influence on the likelihood of dropout. LASSO Regression, incorporating L1 regularisation, was also applied to minimise fitting error. In this case, 10-fold cross-validation was used to determine the optimal value of λ , allowing the exclusion of irrelevant predictors and mitigating the risk of overfitting.

Additionally, tree-based algorithms were deployed, including Random Forest and Extreme Gradient Boosting (XGBoost). Random Forest was configured with an appropriate number of trees and tuned hyperparameters to reduce variance and enhance model stability, while XGBoost iteratively improved predictive accuracy through gradient boosting, using parameters designed to control overfitting. Classical machine learning methods such as Support Vector Machines (SVM) with radial basis function kernel were also included to capture non-linear relationships, along with a multi-layer artificial neural network (ANN) in which input features were standardised and weights optimised using backpropagation. The inclusion of a broad range of predictive models aims to enhance the generalisability of the findings, complementing the insights derived from the feature selection techniques.

Standard classification performance metrics were used to compare the models: Accuracy, Precision, Recall (Sensitivity), Specificity, and F1-Score. In the context of dropout prediction, Accuracy reflects the overall proportion of correct predictions. Precision indicates the proportion of correctly predicted positive cases, which is critical to minimise false positives in the identification of at-risk students. Recall (or Sensitivity) is especially important, as it captures the model's ability to correctly identify students who actually drop out—key for the timely implementation of interventions. Specificity measures the model's ability to correctly classify students who remain in school, and the F1-Score, which combines Precision and Recall, offers a balanced metric of model performance.

Several technological tools were used in the development of this study. The RUE database was managed using PostgreSQL. Python and R were employed for both descriptive analysis and predictive modelling, while Microsoft Excel supported exploratory calculations, data validation, and the presentation of results.

Results

The descriptive analysis is based on 706,785 students enrolled in Secondary Education in Paraguay (370,032 female and 336,753 male) during the period 2017–2023, revealing a slight predominance of female students. Table I shows a steady increase in enrolment numbers from 2017, peaking in 2021, followed by a slight decline in 2022 and 2023. Similarly, the number of dropouts increased, with peaks above 21,000 cases in 2019 and 2020, coinciding with the onset of the COVID-19 pandemic, which may have disrupted school continuity. In 2021, the number of dropouts decreased to 14,918, coinciding with the partial return to in-person learning and the implementation of contingency measures. Notably, dropout rates were initially higher among male students (2017–2019), but from 2020 onwards, the female dropout rate surpassed the male rate, reaching 52.25% in 2020 and 57.47% in 2021.

TABLE I. Distribution of Frequency and Percentage of Dropout in Secondary Education by Year and Gender (2017–2023).

Year	Total Enrolment	Dropouts	Dropout Rate (%)	Female Dropouts	% Female Dropout	Male Dropouts	% Male Dropout
2017	87,361	13,378	15.31	5,288	39.53	8,090	60.47
2018	93,061	13,450	14.45	5,809	43.19	7,641	56.81
2019	103,981	21,065	20.26	10,064	47.78	11,001	52.22
2020	106,497	21,969	20.63	11,479	52.25	10,490	47.75
2021	107,529	14,918	13.87	8,574	57.47	6,344	42.53
2022	105,019	—	—	—	—	—	—
2023	103,337	—	—	—	—	—	—
Total	706,785	84,780		41,214	48.61	43,566	51.39

Source: RUE database. Compiled by the authors.

Table II shows that the average age at enrolment in secondary education increased from 15.58 years in 2017 to 17.59 years in 2023, indicating a trend toward delayed entry into the educational phase. Similarly, the average age at dropout rose from 16.47 years in 2017 to 23.46 years in 2021, reflecting longer school retention prior to leaving. The most pronounced increases

occurred in 2020 and 2021, again aligning with the pandemic context. In general, female students dropped out at a later age than male students, and this gender gap widened progressively over the study period.

TABLA II. Average Age at Enrolment and Dropout in Secondary Education by Year and Gender (2017–2023)

Year	Avg. Enrolment Age	Avg. Dropout Age	Dropout Age (Female)	Dropout Age (Male)
2017	15.58	16.47	16.18	16.65
2018	15.79	17.54	18.07	17.14
2019	16.62	20.47	22.01	19.06
2020	16.99	21.72	23.37	19.91
2021	17.40	23.46	24.72	21.78
2022	17.44	—	—	—
2023	17.59	—	—	—

Source: RUE database. Compiled by the authors.

As shown in Table III, dropout rates are on average higher in urban areas (17.39%) than in rural areas (15.95%) across the period. Although these values remain relatively stable, dropout peaks are again evident in 2019 and 2020, with urban zones being particularly impacted. In 2019 alone, urban dropouts rose from 9,979 to 16,037—an increase of over 60%. By 2021, dropout patterns appeared to return to levels observed at the start of the study period.

TABLA III. Frequency and Percentage of School Dropout by Year and Zone (2017–2023)

Year	Rural Enrolment	Urban Enrolment	Rural Dropouts	Rural Dropout %	Urban Dropouts	Urban Dropout %
2017	23,488	63,873	3,692	15.72	9,686	15.16
2018	24,698	68,363	3,471	14.05	9,979	14.60
2019	27,558	76,423	5,028	18.25	16,037	20.98

2020	27,978	78,519	5,424	19.39	16,545	21.07
2021	28,173	79,356	3,421	12.14	11,497	14.49
2022	26,415	78,604	—	—	—	—
2023	25,031	78,306	—	—	—	—
Total	183,341	523,444	21,036	15.95	63,744	17.39

Source: RUE database. Compiled by the authors.

Table IV shows that dropout is predominantly concentrated in state-funded (official) institutions, accounting for more than 80% of total cases, with a slight decrease in 2021 (78.50%). In contrast, private institutions have experienced a proportional increase in dropout throughout the analysis period (2017–2021), while grant-aided private institutions have remained relatively stable with a consistently low dropout rate.

TABLA IV. Distribution of School Dropouts in Secondary Education by Type of Institution (2017–2021)

Year	Official Dropouts	% Official	Private Dropouts	% Private	Grant-Aided Private Dropouts	% Grant-Aided Private
2017	11,565	86.45	1,136	8.49	677	5.06
2018	11,116	82.65	1,727	12.84	607	4.51
2019	17,402	82.61	3,036	14.41	627	2.98
2020	18,375	83.64	2,856	13.00	738	3.36
2021	11,711	78.50	2,765	18.53	442	2.96
Total	70,169	82.77	11,520	13.59	3,091	3.65

Source: RUE database. Compiled by the authors.

The analysis of Table V reveals that the Scientific Pathway accounts for the highest enrolment (343,919) and the greatest number of dropouts in absolute terms (46,554 cases, or 54.91% of total dropouts). However, its relative dropout rate is moderate (13.54%), indicating that despite its popularity, it is not proportionally the most vulnerable. In contrast, the General Pathway shows the highest relative dropout rate (61.77%), representing 32.97% of to-

tal dropouts. Technical Pathways, such as the Industrial and Service Technical Pathways, show lower relative dropout rates (5.48% and 7.76%, respectively). Finally, Vocational Training, while low in enrolment and absolute dropouts, exhibits the highest relative dropout rate (63.48%).

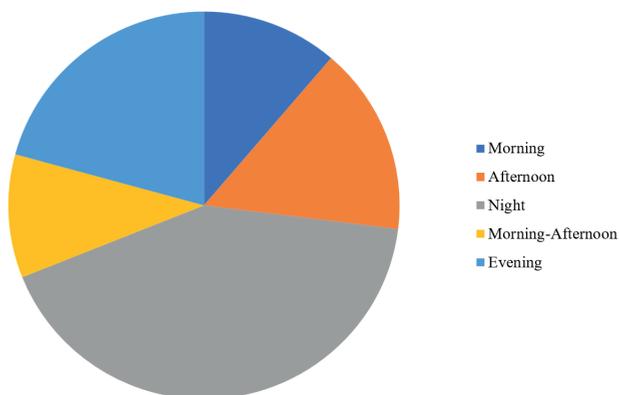
TABLA V. School Dropouts in Secondary Education by Educational Pathway (2017–2021)

Type of Pathway	Total Enrolment	Dropouts	% of Total Dropouts	Relative Dropout Rate (%)
Scientific Pathway	343,919	46,554	54.91	13.54
Service Technical Pathway	80,374	6,241	7.36	7.76
General Pathway	45,257	27,956	32.97	61.77
Industrial Technical Pathway	14,568	798	0.94	5.48
Agricultural Technical Pathway	11,797	1,635	1.93	13.86
Vocational Training	2,514	1,596	1.88	63.48

Source: RUE database. Compiled by the authors.

Figure I illustrates the relative dropout rate by school shift, showing marked differences. The night shift registers the highest rate (42%), probably due to the workload or family responsibilities faced by its students. It is followed by the evening shift (20.8%) and the afternoon shift (15.7%), both with considerable dropout risk. In contrast, the morning-afternoon (10.3%) and morning (11.3%) shifts show lower dropout rates.

FIGURE I. Relative Dropout Rate by School Shift (2017–2021)



Source: RUE database. Compiled by the authors.

Table VI shows that students who have not repeated any academic year in secondary education have a dropout rate of 11.70%. In contrast, those who have repeated at least once show a significantly higher rate (24.92%), indicating that grade repetition is associated with a higher risk of dropping out. Similarly, the relative dropout rate remains at comparable levels for students who have repeated two or three times.

TABLA VI. School Dropouts by Number of Repeated Academic Years (2017–2021)

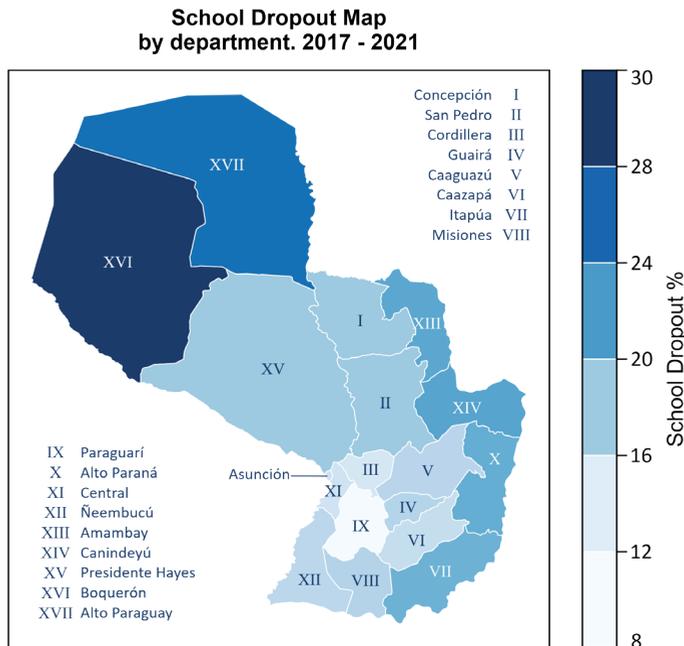
Number of Repeated Years	Total Students	No Dropout	Dropouts	Dropout Rate (%)
0	690,499	609,743	80,756	11.70
1	14,926	11,207	3,719	24.92
2	1,214	937	277	22.82
3	133	106	27	20.30
More than 4	13	12	1	7.69

Source: RUE database. Compiled by the authors.

Figure II shows the dropout rate by department in Paraguay. Alto Paraguay and Boquerón report rates exceeding 24%, likely due to geographic isolation and socio-economic disadvantages. In contrast, departments such

as Central and Paraguairí exhibit lower dropout rates. It is also evident that departments with international borders—particularly those adjacent to Brazil and Argentina—tend to register higher dropout rates during the analysis period.

FIGURE II. Dropout Rates by Department (2017–2021)



Source: RUE database. Compiled by the authors.

Case Study: 2017 Cohort

A predictive approach was developed based on the analysis of a cohort of students who entered the first year of upper secondary education (Educación Media) in Paraguay in 2017. A rigorous feature selection process was carried out, and several predictive models of school dropout were implemented; the results are presented below.

Feature Selection

This section summarises the metrics obtained from Logistic Regression, Random Forest (evaluated using the MDA and MDG criteria), and LASSO Regression for the five variables selected according to the four criteria. Table VII presents the numerical values for the most relevant variables identified by each method, allowing their relative importance to be assessed.

TABLA VII. Feature selection metrics. Relevant variables for the implemented methods.

Variable	Logistic Regression (Significance)	Random Forest (MDA)	Random Forest (MDG)	LASSO Regression (Coefficient)
Age (in years)	15.7	34.03	492.42	0.611
Pathway	23.3	16.85	256.09	5.49
Shift	12.6	12.57	158.14	1.29
Department	6.71	8.54	390.69	2.33
Overage	2.59	22.27	216.42	0.201

Source: RUE database. Compiled by the authors.

The variables Age (in years), Pathway, School shift, Department, and Overage were selected consistently, capturing key dimensions of the student profile and institutional context. The literature supports that age, and especially overage, is a critical determinant of student retention, as academic lag increases the risk of dropping out. In addition, Pathway, Department, and School shift may be reflecting the effect of socio-economic and cultural inequalities on school continuity.

Other variables were moderately selected by three methods, such as Modality – which classifies the curriculum into Scientific, Technical, Vocational, and Open Pathways – School management type (official, private, or grant-aided), and household characteristics, such as availability of appliances, which reflect socio-economic status.

Finally, at least two methods consistently selected variables such as Student gender and Number of repeated grades – a classic indicator of academic difficulties and a variable associated with dropout – along with school type (e.g., Indigenous Educational Institution), zone (rural or urban), father’s employment status, mother’s or guardian’s educational attainment, and the

district of the school. Although these variables were selected with less consistency, they complement the model by capturing indirect but relevant aspects of school persistence. For example, in this cohort, students whose mothers had completed primary education had a dropout rate of approximately 13%, which decreased to 8% if the mother had completed secondary education, and to only 4% when the mother held a university degree. Similarly, students whose parents held stable jobs (in the public or private sector, or as employers) exhibited dropout rates between 7% and 10%, while those in occupations with less job security reached rates as high as 15%–19%. These findings are consistent with literature highlighting the influence of socio-economic conditions on educational trajectories. The lower presence of these variables in some selection methods could be due to collinearity with other predictors capturing similar dimensions. Thus, even if mother’s education or father’s occupation are not explicitly included in all models, their effects may be reflected through correlated variables.

Predictive Models of School Dropout

Table VIII summarises the performance metrics obtained by each of the models implemented for dropout prediction. They include: Accuracy, Precision, Recall, Specificity and F1-Score.

TABLE VIII. Performance of Predictive Models for Dropout Prediction.

Model	Accuracy	Precision	Recall	Specificity	F1-Score
Logistic Regression	0.7332	0.2436	0.5980	0.7513	0.3462
Random Forest	0.7054	0.2269	0.6207	0.7167	0.3323
LASSO	0.7134	0.9312	0.7288	0.5980	0.8177
XGBoost	0.7062	0.2283	0.6247	0.7172	0.3344
SVM	0.7022	0.2227	0.6107	0.7145	0.3264
Neural Networks	0.7198	0.2364	0.6154	0.7338	0.3416

Source: RUE database. Compiled by the authors.

Considering the results in Table VIII, Logistic Regression achieves the highest accuracy (0.7332), meaning that 73.32% of predictions (dropouts and non-drop-

outs) are correct, and its recall (0.5980) indicates that it identifies approximately 60% of students who actually drop out. However, its precision is low (0.2436), implying that a significant proportion of positive predictions correspond to students who do not drop out.

Random Forest and XGBoost show similar performance, with recall values above 0.62, which supports the identification of at-risk students. However, their precision is limited (≈ 0.22), reflected in relatively low F1-scores (≈ 0.33). SVM follows a similar pattern, with recall of 0.6107 and precision of 0.2227, along with comparatively lower accuracy and F1-score. Neural Networks reach an intermediate accuracy (0.7198) and recall (0.6154), results comparable to those of Logistic Regression.

LASSO Regression stands out for its high precision (0.9312) and recall (0.7288), resulting in an F1-score of 0.8177—the highest among all evaluated models. Although its accuracy is 0.7134, its sensitivity makes it a solid option for identifying students at risk, while its high precision helps minimise false positives. Based on the values in Table VIII, it can be concluded that LASSO offers the best overall performance for predicting dropout using the selected variables.

In addition to its strong predictive performance, LASSO Regression provides a parsimonious model by discarding coefficients with no significant effect, while maintaining the interpretability of Logistic Regression. For example, for the variable Age, the estimated coefficient ($\beta \approx 0.847$) translates into an Odds Ratio of $\exp(0.847) \approx 2.33$, meaning that—holding all other variables constant—a student one year older is 2.33 times more likely to drop out.

The interpretation of the remaining variables is less direct, as they are categorical predictors converted into dummy variables. However, the Odds Ratio still allows us to intuitively assess their impact: the variable School shift is the second most influential (OR ≈ 1.13), while Department (OR ≈ 1.02) and Pathway (OR ≈ 0.99) have a more limited effect. In addition, the coefficient associated with Overage is reduced to zero (OR = 1), indicating that, in this penalised model, Overage does not contribute additional predictive value, likely because its effect is already captured by the Age variable.

In the context of this study, LASSO Regression demonstrates a particularly robust performance by combining high sensitivity and precision. Its ability to regularise through L1 penalisation facilitates the elimination of variables with lower relevance, resulting in a parsimonious and interpretable model that prioritises the predictors most strongly associated with dropout. Under these conditions, LASSO emerges as the most appropriate alternative for the early identification of students at risk, by minimising both false positives and model complexity.

Conclusions

This research was based on an extensive dataset from the Registro Único del Estudiante (RUE) of Paraguay's Ministry of Education and Science (MEC), covering the period 2017–2023 and comprising a large volume of records. Its methodological strengths—particularly the use of official data and rigorous analytical techniques—provide solid evidence on secondary school dropout in Paraguay. Moreover, the limited number of Latin American studies using official administrative data focused on pre-university levels reinforces the contribution of this work.

The descriptive analysis reveals a steady increase in enrolment between 2017 and 2021, with dropout peaks in 2019 and 2020. The outbreak of the pandemic in 2020 exacerbated dropout in a context where education shifted to distance learning; in 2021, dropout declined under containment measures and a partial return to in-person classes. Regarding gender, although dropout was initially higher among male students, from 2019 onwards a progressive increase in the female share is observed. In addition, the average student age increased from 2017 to 2023, suggesting a rise in overage and academic lag.

Geographically, dropout patterns were similar across urban and rural areas; however, dropout rates were significantly higher in official institutions compared to private or grant-aided schools. There are marked differences across departments, with the night shift consistently showing the highest dropout rates. In terms of pathway, the General Pathway and Vocational Training Pathway recorded the highest dropout percentages. In addition, first-time repetition of a school year emerges as a critical factor and trigger for dropout.

The feature selection process underscored the relevance of age (especially overage), pathway, shift, and department as variables that consistently explain dropout. Older age within a given school year significantly increases dropout risk. Departments reflect territorial disparities, and the night shift in Paraguay is often associated with labour and family responsibilities. Pathways such as Vocational Training tend to concentrate students with immediate needs for labour market insertion or lower prospects of pursuing further studies, contributing to their higher dropout rates. While overage and grade repetition had already been identified as strong predictors (Conde et al., 2023), this study broadens the scope by clearly highlighting the influence of pathway and school shift, which have received relatively little attention in the literature.

Model performance comparisons show that LASSO Regression balances recall and precision in an outstanding way: it identifies approximately 73% of actual dropout cases (recall) and correctly classifies 93% of positive predictions (precision). This balance is reflected in an F1-score of ≈ 0.82 , the highest among all models, making it the most promising technique for the early identification of at-risk students. Its robustness and interpretability make it suitable for guiding early warning systems,

by effectively identifying students at risk while minimising false positives.

The practical implications of the study highlight the need to design interventions targeting both structural factors (territorial disparities, specific support for night shifts) and individual factors (grade repetition, overage, vocational guidance). Policy makers are encouraged to reinforce efforts in official institutions, where dropout is most concentrated—especially in the night shift, General Pathway, and Vocational Training Pathway—and to pay close attention to students with at least one repeated year. Additionally, it is essential to develop guidance and tutoring programmes involving families, ensuring coordinated actions inside and outside the school environment. As proposed by Gutiérrez-de-Rozas et al. (2023), these programmes should focus on non-cognitive dimensions (e.g., self-esteem, social and life skills, decision-making) and on teaching and learning strategies.

As a contribution to the literature, this study demonstrates the value of large-scale official administrative data for analysing school dropout in Latin America. By linking socio-demographic, academic, and institutional variables for over 700,000 students, it confirms that overage and school history (particularly repetition) remain strong predictors of dropout. It also shows that certain pathways, attendance in the night shift, and territorial inequalities reflect how structural factors continue to shape educational disengagement. This study not only contributes to international evidence on the role of socio-economic and school factors in school dropout (Hernández-Leal et al., 2021), but also underscores the analytical power of census data for informing student retention policies, especially in contexts where Education Information and Management Systems (EMIS) are still under development (Arias et al., 2021).

The limitations of the study include the coverage and quality of certain RUE fields, and the absence of psychosocial and economic factors, which could enhance model accuracy. As directions for future research, we suggest extending the time series to better assess the long-term effects of the pandemic on dropout in Paraguay, exploring qualitative variables (e.g., motivation, school climate, family involvement), and adopting alternative methodologies, such as time series models or causal inference techniques, while integrating external datasets (e.g., social programmes, health statistics) for a more comprehensive analysis of dropout risk. In addition, it would be valuable to compare these findings with results from emerging artificial intelligence methods, such as deep neural networks, recurrent networks, or transformer-based architectures, capable of capturing complex temporal patterns in educational trajectories (Kusumawardani & Alfarozi, 2023; Nguyen et al., 2024).

In sum, this paper contributes to the understanding of dropout in secondary education in Paraguay and Latin America, demonstrating the potential of data analytics for informing education policy. Implementing these recommendations and strengthening information systems may enhance the responsiveness of education authorities, leading to improved student retention and completion rates.

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Research section

Attentional processes and daily stress in a schoolchild population: exploring their relationship

Procesos atencionales y estrés cotidiano en población escolar: un estudio exploratorio de su relación

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Abstract

Today we are witnessing a sharp increase in attentional difficulties in students, as well as the presence of increasingly frequent and intense stress symptoms from the earliest years of schooling. The aim of this study, therefore, is to analyze the relationship between children's attentional and inhibitory control processes and their daily stress. A non-experimental, quantitative, correlational and inferential study was designed, in which 558 fifth- and

sixth-graders participated. The results indicated a tendency towards greater attention (sustained and selective), attentional capacity, and impulsivity control when school stress and overall stress were lower. Higher levels of attention deficit, behavior disorders, and hyperactivity with attention deficit, were also observed to correspond with increased stress levels in the four areas analyzed (health, school, family and overall). Based on these relationships, we have verified the predictive nature of attention deficit for school and global stress. In conclusion, and based on the educational neuroscience paradigm, there is a need for teaching actions that develop students' attentional processes, as well as their strategies for coping with stress.

Keywords: daily stress, school stress, attention, impulsivity, primary education.

Resumen

En la actualidad, se constata un crecimiento exponencial de las dificultades atencionales en los estudiantes, así como, la presencia de cuadros de estrés cada vez más frecuentes e intensos desde los primeros años de escolaridad. En esta línea se plantea este estudio con el objetivo de analizar las relaciones entre procesos atencionales y de control inhibitorio y el estrés cotidiano infantil. Se diseñó un estudio no experimental, cuantitativo, correlacional e inferencial en el que participaron 558 estudiantes de 5º y 6º curso de primaria. Los resultados indican la tendencia a una mayor atención (sostenida y selectiva), de la capacidad atencional y de control de la impulsividad cuando es menor el estrés escolar y el estrés en general. Asimismo, se observa que mayores niveles de déficit de atención, de trastornos de conducta y de hiperactividad asociada al déficit de atención, se corresponden con un incremento de los niveles de estrés en los cuatro ámbitos analizados (salud, escolar, familiar y global). Con base en estas relaciones, se comprueba el carácter predictivo del déficit de atención en el estrés escolar y global. Como conclusión y tomando como base el paradigma de la neurociencia educativa, se reclaman actuaciones docentes para desarrollar los procesos atencionales del alumnado, así como de estrategias de afrontamiento del estrés.

Palabras clave: estrés cotidiano, estrés escolar, atención, impulsividad, educación primaria.

Introduction

Attention is a cognitive process involving a set of brain processes that interact among themselves, and that intervene in coding and processing information from the most relevant stimuli or tasks. In line with psychologists, educators

and scientists who are concerned with understanding maturational development and learning processes in childhood (Piaget & Inhelder, 2015), recent studies focus on analyzing processes like mental flexibility, attention, concentration, and executive functioning, among others (Baggetta & Alexander, 2016; Chen et al., 2017; Martínez-Vicente et al., 2023; Restrepo et al., 2019; Rojas-Barahona, 2017). Attention is a control mechanism that plays a fundamental role not only in hierarchical organization of neurocognitive processes, but also in affective-motivational processes (Folgado dos Santos et al., 2020; Ison et al., 2015; Rosa et al., 2020).

In defining the term attention, several explanatory models of increasing complexity have been considered. The traditional idea, considered to be too limited, has been discarded in favor of its definition as an active, constructive mechanism by which each person generates their own attentional potential. Today, taking into account the stimulus and the length of concentration thereon, attention is accepted as having three networks that are functionally and anatomically independent (Llorens et al., 2015). Thus, the alerting network allows the person to maintain a vigilant state, the orienting network is responsible for moving attention in order to attend to sensory events, and the executive network allows for monitoring and conflict resolution in situations of interference (González et al., 2001; Petersen & Posner, 2012). According to the model from Portellano and García (2014), attention is subdivided into two modalities, passive and active. The passive modality, more rudimentary and nonspecific, is involuntary and is not linked to the more immediate motives, needs or interests of the individual. This type of attention encompasses the state of alert and the orienting response. On the other hand, active attention consists of attentional processes that stem from the individual's motivations. Active attention is deployed through intentional, conscious, volitional, and practical actions. Within this modality, we find different types of attention including: selective attention, which maintains a cognitive schema, while avoiding distracting stimuli; focused attention, which concentrates on specific information for carrying out a task, processing the relevant stimuli and ignoring the irrelevant; divided attention, making it possible to respond to different stimuli while carrying out a single task; sustained attention, by which vigilance and response to certain stimuli are maintained during a cer-

tain lapse of time; and alternating attention, which maintains cognitive flexibility, switching between tasks with different cognitive executions, and exercising the necessary control to handle them effectively (Portellano & García, 2014; Sánchez et al., 2015; Tejedor-Tejedor et al., 2008).

Research on the deployment of attentional processes is complicated by the difficulty of separating them from processes of coding, memory, and executive functioning itself (Portellano, 2018). Attentional problems are usually accompanied by others related to information processing, which suggests an impairment in learning and academic performance. These difficulties may be due to lack of motivation, inability to focus, lack of concentration, lack of flexibility in switching the focus of attention between two or more important elements, an inadequate level of activation, and so on (Capdevila-Brophy et al., 2006; Tejedor-Tejedor et al., 2008).

Attention and memory mechanisms constitute the primary neuropsychological functions that sustain processes of learning. In many cases, attention deficits or inattention become inherent to a child's development process; this poses a real problem as children grow older and lack attentional strategies or develop inadequate attention habits. Attention is a key element in learning given its close, coordinated relationship with other cognitive processes like memory, motivation, capacity for adaptation, and self-control (Ruff & Rothbart, 1996). Many difficulties seen in students are due to dispersed attention, becoming tired and quickly giving up on tasks, absence of tracking graphic elements, and a lack of concentration and listening to the teacher's instructions, especially in activities that seem demotivating or uninteresting. This situation has led to increased interest in the study of attention on the part of psychologists, pedagogy experts, and neuroscientists, given the impact of attention on children's global development (Monteoliva et al., 2017). Accordingly, attentional functioning has become a primary object of study for neurodidactics or educational neuroscience. This paradigm attests that, in order to promote and enhance knowledge acquisition in the school environment, the most suitable methodologies and strategies must be applied. Teachers must have knowledge of neural systems, and the processes involved in brain functioning (Bernabéu, 2017; Bullón-Gallego, 2017; Tapia et al., 2018).

Elsewhere, the presence of anxiety and stress are recognized as im-

portant risk factors for well-being and for the personal, psychological, and academic development of children and adolescents. The pertinent scientific literature has shown that most negative consequences affecting students who experience stress are psychological, and bring about problems with learning, anxiety and depression (Palacio Chavarriaga et al., 2018). Not to be overlooked, psychosomatic issues may also affect health; for example, gastrointestinal or skin troubles, and physical complaints (Del Barrio, 2003). Potentially, the consequences of stress are regulated by coping strategies, that is, behavioral and cognitive efforts that change according to external and/or internal demands, and to each individual's available resources for meeting those demands (Lazarus & Folkman, 1986; Morales & Trianes, 2012). In recent years, there has been an abundance of studies on stress in relation to affective-motivational variables involved in learning (Martínez-Vicente et al., 2019; Valiente-Barroso et al., 2020a; Valiente-Barroso et al., 2020b), in addition to those that focus on stress as a consequence of life occurrences, such as school phobias, harassment at school, natural disasters, or grief over the loss of a family member (Furlan et al., 2009; Gaeta, 2013).

In Psychology, studies about stress take different approaches, making it possible to pursue research from different angles. When defining stress, four factors are considered: the presence and identification of an event; the disturbance of physiological and psychological balance; cognitive, emotional, and neurophysiological consequences; and the changes that undercut the individual's ability to adapt. Accordingly, stress is approached from three perspectives that correspond to stress as a stimulus, stress as a response, and stress as a transaction between the person and the environment (Trianes 2002; Trianes et al., 2012). Stress as a stimulus is the product or accumulation of various events involving the experience of threatening and harmful situations that put excessive demands on the person. Stress as a response is the psychophysiological reaction to stressful situations, in other words, the individual's response, experience, or reaction to stressors. Finally, stress as a transaction between the person and the environment includes cognitive variables and the mediational processes that trigger it. Its components are the demands of the context; the individual's perception of threat, harm, or loss; the lack of sufficient resources to meet the demands; the triggering of a negative emotional

experience; and consequently, the danger of inadaptation or the development of a psychopathology (Trianes, 2002).

Children's daily stress fits into the perspective of stress as a stimulus, because it results from frustrating, irritating demands in constant interaction with the environment, and which more deeply impact emotional development than do other chronic stressors (Torres et al., 2014; Trianes et al., 2011). These types of external events or stressors are frequent worries, incidents, problems or disappointments, which, though low in intensity, can do noticeable harm in the areas of health, family, and school. Their consequences constitute an upset to the physiological and psychological balance, provoking internalized symptomatology, such as external locus of control, feelings of incapacity, low self-esteem, anxiety and depression (Escobar et al., 2010; Trianes et al., 2012).

In a school-age population, the following are some of the important stressors identified: test-taking, learning difficulties, excess of homework and extracurricular activities, time limits to turn in assignments, class participation, curricula, academic demands, attention and concentration deficits, lack of reading comprehension, poor report card grades, competitiveness, difficulties in peer relationships, and social rejection (Aselton, 2012; Cobo-Cuenca et al., 2012; Pulido et al., 2011; Shiralkar et al., 2013; Sohail, 2013; Trueba et al., 2013). Certain learning situations, such as homework overload, high demands, and a merely instructive teaching methodology can become stressors for children, who respond with negative, hostile attitudes, and consequently their achievement falls (Pérez, 2012). Other stressors have to do with certain negative situations in the family setting, such as high demands, financial problems, insufficient attention from parents, sickness or death of a loved one, and parental separation or divorce. On the other hand, regarding health, sickness and doctor visits are constant sources of worry (Pozos-Radillo et al., 2015; Pulido et al., 2011; Trueba et al., 2013).

Continuous pressures in daily life, unpleasant micro-events or challenges in the daily routine, are defined as micro-stressors (Johnson & Swendsen, 2015) and are considered risk factors as they build upon each other, contributing to emotional and behavior impairment in children and adolescents (Bridley & Jordan, 2012). Cases of stress can become visible through

psychological, physical, and behavioral symptoms. Demotivation, uninterest, reduced intellectual performance, anxiety, mistakes in memory, affective lability, dispersed attention, lack of concentration, irritability, indifference and apathy are all psychological symptoms. Among the physical symptoms, we find digestive issues, general discomfort, headaches, sleep alterations, and body aches and pains. Finally, the most common behavioral symptoms are increased mistakes, blocks, unfinished homework, rejection toward school and difficulties relating to peers (Maturana & Vargas, 2015).

In the scientific literature, there are studies in a Spanish population that address attentional processes and their relationship to, or repercussions on academic achievement, as well as other studies that consider certain emotional issues associated with anxiety or depression (Fernández-Castillo & Gutiérrez-Rojas, 2009; Reveló-García & Suárez-López, 2024). To date, however, there is a lack of studies that analyze these processes in depth, and take into account psychological variables and variables of well-being, such as children's daily stress. Attention deficits can result in a drop in academic achievement, which in turn can be the cause of behavior problems, and then trigger the presence of anxious or depressive symptomatology (Barriga et al., 2002; Cole et al., 2001). These problems, when identified early, can receive intervention and so reduce the risk of suffering associated disorders (Herman et al., 2007).

Although there is little empirical evidence that addresses the relationship between attention and daily stress, previous studies analyze the relationship between daily stressors and cognitive performance. The results indicate that children with higher scores in daily stressors reveal less capacity for sustained attention and need more time to recall information in working memory (Maldonado et al., 2008). It can thus be affirmed that students subject to constant daily stress tend to have lower capacity of sustained attention and episodic memory, they have concentration problems and are usually unmotivated toward schoolwork, resulting in lower academic achievement than expected (Suárez-Riveiro et al., 2020; Torres et al., 2014).

Recent studies show that emotional impairments, stress, fear and anxiety have direct repercussions on processes of attentional control and selective attention. Selective processes can be affected by stress that prompts a network

of excessive vigilance. In the classroom, some students may be more tuned in to peripheral information that comes through auditory stimuli, making it hard to draw their attention to the content they are learning at that time (Carmargo & Riveros, 2015). There is an innovative line of work that focuses on the development of attentional networks through training from an early age, with impact on both the brain and behavior. Results from research that focused specifically on executive attention confirm the importance of brain plasticity for responding to environmental stimuli through modifications and adjustments in structural and functional brain architecture (Juárez-Ramos & Fuentes-Canosa, 2018; Molina-Rodríguez et al., 2018).

Taking into account the theoretical concerns presented above, the general aim of this study was to analyze the relationship between attentional and inhibitory control processes, and children's daily stress, in a sample of fifth- and sixth- graders. One specific objective derived from this general aim is to verify whether there are differences in these attentional and inhibitory processes according to different levels (low, medium and high) of school stress and general stress. Finally, we analyzed the predictive value of attentional and inhibitory processes for children's daily stress, in the school context and the general environment.

Method

Participants

Participating in this study were 558 students from a non-clinical population of fifth- and sixth-graders. All were enrolled in nine (public and charter) schools from the region of Cantabria (Spain). Non-probability, convenience sampling was used, with representativeness ensured at all times. Of the participants, 295 (52.86 %) were boys (150 fifth-graders and 145 sixth-graders) and 263 (47.14 %) were girls (140 fifth-graders and 123 sixth-graders). Their ages ranged from 10 to 12 years ($M = 10.76$, $SD = 0.67$).

Instruments

To collect information on their attentional and inhibitory control processes, we used the following instruments:

The *FACES* test of perception of similarities and differences, revised (CARAS-R, in Spanish) (Thurstone & Yela, 2012), assesses visuoperceptual and attentional capacity, as well as the subject's impulsivity in task execution. It contains 60 graphic elements that represent faces, where the students' task is to identify which of the three faces is different in each set, and cross it out. The test can be applied individually or collectively, and the time allotted to complete the test is three minutes. The present study considered scores in sustained and selective attention, errors committed, attentional and visuoperceptual capacity, and the Impulse Control Index (ICI), which identifies lack of inhibitory control. Internal consistency for the total sample, as measured by Cronbach's alpha coefficient, was 0.91.

The Spanish adaptation (Farré & Narbona, 2013) of Conners' ADHD Rating Scale (*EDAH*), was used to assess ADHD, risk of ADHD, and behavioral disorders, whether or not concomitant. This test is a teacher-report, based on previous observation of the student's behavior. The scale contains 20 items with Likert-type responses from 1 (not at all) to 4 (very much); these are divided into two subscales of 10 items each, corresponding to attention deficit with hyperactivity and behavior disorders. Results are produced for two other subscales, on hyperactivity/impulsivity and attention deficit. This study considers students' scores on the four subscales. Internal consistency for the global scale, as measured by Cronbach's alpha coefficient, was 0.95.

The *Inventario de Estrés Cotidiano Infantil (IECI)* [Children's Daily Stress Inventory] (Trianes et al., 2011) was used to measure perceived stress. It contains 22 yes/no questions that provide information to assess daily stress in boys and girls enrolled in primary education. For this study, we initially considered the results of its scales on health problems, stress at school, and stress in the family, as well as an overall stress measurement which is a sum of the three. Internal consistency for the global scale, as measured by Cronbach's alpha coefficient, was 0.81.

Procedure

We first contacted the school administration at each school to request an in-person meeting, where we would present the research project and report on the study aim. After agreeing to participate, the head of studies at each school conveyed the information to the families and to each homeroom teacher from the participating classrooms, with support from the guidance counselors in all cases. Following this, written informed consent was requested from the families; after it was obtained, the tests were administered in each classroom by a member of the research team, always in the presence of the homeroom teacher. Both of them controlled the distracting elements in the application of the attention and impulsivity control test. The conditions and instructions for each test were explained, and students were assured of anonymity and data confidentiality. The same day of the classroom tests, the homeroom teacher for each student was given their EDAH questionnaire. These were completed and collected at a later time by a member of the research team. The collected data was handled according to Spanish legislation (Organic Law 3/2018, 5th December, on Protection of Personal Data and Guarantee of Digital Rights), ensuring respect for the dignity, integrity, and identity of study participants.

Data analysis

Given the level of inquiry into the object of study, an exploratory study was designed, with a nonexperimental, cross-sectional, descriptive, correlational and inferential methodology. All data analyses were performed using IBM SPSS version 29.0 for Windows.

First, the variables' goodness of fit to normal distribution was calculated using the Kolmogorov-Smirnov test, and also homoscedasticity. After seeing that most of the study variables did not meet the normality principle, we elected to use nonparametric statistical tests. Correlation analyses were conducted using Spearman's Rho coefficient, and two differential analyses were carried out using the Kruskal-Wallis H test for ($k \geq 2$) independent samples, to examine whether there were significant differences in attentional and inhibitory processes based on the level of school stress and overall stress

(given the previously tested correlations between these variables). In both cases, three groups are formed according to level of stress (low, medium and high), based on calculations of the mean and standard deviation. In the case of school stress, Group 1 was formed of scorers falling between the minimum score and the mean minus one-half standard deviation (0; .89), taking in 16.48 % of students, who had a low stress level. Group 2 was formed of students with scores ranging between the mean minus one-half standard deviation and the mean plus one-half standard deviation (.90; 2.30), which represented 45.34 % of the total sample, who had a medium stress level. Group 3 scores ranged between the mean plus one-half standard deviation, and the maximum score on school stress (2.31; 7), representing 38.17 % of the students, who had a high stress level. As for overall stress, Group 1, with scores ranging from the minimum score to the mean minus one-half standard deviation (0; 3.33), took in 39.06 % of students, who had low stress levels. Group 2 was formed of students with scores ranging between the mean minus one-half standard deviation and the mean plus one-half standard deviation (3.34; 6.66), which represented 31.72 % of the total sample, who had a medium stress level. Group 3 was formed of students with scores ranging between the mean plus one-half standard deviation and the maximum score in overall stress (6.67; 16), representing 29.21 % of the sample, who had high overall stress. In addition, whenever there were significant between-group differences, *post hoc* contrasts were carried out using the Mann-Whitney U, with the Bonferroni correction, whose significance value was established at .05. Cohen's *d* was also calculated to learn the effect size of the differences found; its interpretation is simple, with small ($.20 \leq d \leq .50$), moderate ($.51 \leq d \leq .79$) and large ($d \geq .80$) (Sun et al., 2010).

Finally, two stepwise, multiple linear regression analyses were conducted in order to study the predictive nature of attentional and inhibitory processes for daily stress, considering the criterion or dependent variables to be school stress and overall stress.

Results

Correlational analysis

Table I shows results from the correlation analysis between the variables pertaining to attentional and inhibitory processes and children's daily stress. The variables of sustained and selective attention, attentional and visuoperceptual capacity, and the impulsivity control index had statistically significant, low-intensity, negative relationships with stress on the school and overall scales. The variables of attention deficit, behavior disorders, and attention deficit with hyperactivity showed statistically significant, positive, low-intensity relationships with stress in the four spheres analyzed (health, school, family and overall). On the other hand, statistically significant, positive relations were observed between the error's variable and stress in the health and overall scales. Finally, hyperactivity/impulsivity showed statistically significant, positive relationships with school and overall stress.

TABLE I. Correlations between attentional and inhibitory processes and children's daily stress

	1	2	3	4	5	6	7	8	9	10	11	12
A (1)	1											
E (2)	-.03	1										
AV (3)	.98**	-.22**	1									
ICI (4)	.21**	-.93**	.39**	1								
H (5)	-.06	.08	-.08	-.11**	1							
AD (6)	-.15**	.15**	-.18**	-.17**	.50**	1						
BD (7)	-.11**	.14**	-.13**	-.17**	.72**	.51**	1					
H-AD (8)	-.12**	.14**	-.15**	-.17**	.86**	.87**	.71**	1				
HS (9)	-.05	.09**	-.07	-.06	.03	.13**	.10*	.09*	1			
SS (10)	-.12**	.08	-.13**	-.11*	.15**	.31**	.12**	.26**	.37**	1		
FS (11)	-.04	.08	-.06	-.06	.06	.18**	.09*	.11*	.25**	.38**	1	

OS (12)	-.09**	.12**	-.12**	-.11*	.11*	.26**	.15**	.21**	.74**	.77**	.68**	1
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Note. A=Selective and sustained attention; E= Errors; AV= Attentional and visuoperceptual capacity; ICI=Impulse Control Index; H=Hyperactivity/impulsivity; AD= Attention deficit; BD= Behavior disorder; H-AD= Hyperactivity-attention deficit; HS: Health stress; SS: School stress; FS: Family stress; OS: Overall stress

** $p < .01$; * $p < .05$

Source: Compiled by the authors

Differential analyses according to levels of school stress and overall stress

Considering the correlational results, we choose to conduct two differential analyses of attentional and inhibitory processes, according to the different levels of school stress and overall stress. In the case of school stress, results from the Kruskal-Wallis H test showed statistically significant differences in attention deficit, behavior disorders, and attention deficit with hyperactivity, as a function of different levels of students' school stress (Table II).

TABLE II. Kruskal-Wallis H test as a function of school stress groups

Variable	Mean Rank			χ^2	η_p^2
	Low school stress (n = 92)	Medium school stress (n = 253)	High school stress (n = 213)		
Selective and sustained attention	278.22	278.52	261.46	1.49	.002
Errors	246.91	277.84	275.96	3.27	.006
Attentional and visuoperceptual capacity	284.63	278.99	258.09	2.69	.003
Impulse Control Index	297.07	266.37	267.80	3.17	.003
Hyperactivity/impulsivity	250.04	278.17	290.91	4.43	.010
Attention deficit	232.28	276.99	299.83	11.70**	.020
Behavior disorder	238.66	268.86	306.79	14.26***	.017
Hyperactivity-attention deficit	231.08	276.99	300.33	11.98**	.019

*** $p < .001$; ** $p < .01$; * $p < .05$

Source: Compiled by the authors

To ascertain what between-group differences existed in school stress, the Mann-Whitney U was calculated, taking the groups two by two, and applying Bonferroni's correction (Table III). The results indicated that in hyperactivity/impulsivity, attention deficit, behavior disorder, and attention deficit with hyperactivity, there were significant between-group differences between high and low groups in school stress; and between low and medium school-stress groups in attention deficit and attention deficit with hyperactivity; and between medium and high school-stress groups in behavior disorders.

TABLE III. Comparison of attentional and inhibitory processes according to school-stress groups

	Group	<i>M</i>	<i>SD</i>	Group	<i>M</i>	<i>SD</i>	<i>U</i>	<i>d</i>
Hyperactivity/impulsivity	Low	2.11	2.95	High	3.15	3.84	8197.50*	-.30
Attention deficit	Low	2.24	2.79	Medium	3.34	3.67	9580.50*	-.33
		2.24	2.79	High	3.76	3.70	7229.50***	-.46
Behavior disorder	Low	2.31	3.96	High	4.09	5.30	7259.00***	-.38
	Medium	3.11	4.77	High	4.09	5.30	23245.00**	-.19
Hyperactivity-attention deficit	Low	4.36	5.06	Medium	6.06	6.20	9514.00*	-.35
		4.36	5.06	High	6.92	6.53	7188.00***	-.49

*** $p < .001$; ** $p < .01$; * $p < .05$

Source: Compiled by the authors

On the other hand, in the case of overall stress, results from the Kruskal-Wallis H test, as shown in Table IV, indicated statistically significant differences in selective and sustained attention, attentional and visuosperceptual capacity, attention deficit, behavior disorders, and attention deficit with hyperactivity, according to students' level of overall stress.

TABLE IV. Kruskal-Wallis H test as a function of overall-stress groups

Variable	Mean Rank			χ^2	η_p^2
	Low stress level (n = 218)	Medium stress level (n = 177)	High stress level (n = 163)		
Selective and sustained	294.10	261.03	257.25	6.43*	.012
Errors	264.52	261.04	294.10	4.78	.011
Attentional and visuoperceptual capacity	296.82	260.98	253.52	8.32*	.016
Impulse Control Index	280.05	282.45	252.55	4.22	.009
Hyperactivity/impulsivity	266.04	284.67	291.89	2.88	.013
Attention deficit	236.98	285.02	330.37	32.96***	.065
Behavior disorder	250.79	290.50	305.95	13.25***	.024
Hyperactivity-attention deficit	243.42	285.41	321.34	22.49***	.045

*** $p < .001$; ** $p < .01$; * $p < .05$

Source: Compiled by the authors

The differences in overall stress were analyzed with Mann-Whitney U, taking the groups two by two, and applying Bonferroni's correction. Following the results shown in Table V, significant differences were observed between the low and medium stress groups and between the low and high groups, in selective and sustained attention, attentional and visuoperceptual capacity, attention deficit, behavior disorders, and attention deficit with hyperactivity. In addition, significant differences were observed between the medium and high stress groups, in errors committed, attention deficit, and attention deficit with hyperactivity.

TABLE V. Comparison of attentional and inhibitory processes according to overall-stress groups

	Group	<i>M</i>	<i>SD</i>	Group	<i>M</i>	<i>SD</i>	<i>U</i>	<i>d</i>
Selective and sustained	Low	36.80	8.43	Medium	34.95	8.32	16496.00*	.22
		36.80	8.43	High	36.64	9.64	14442.50*	.02
Errors	Medium	.97	1.94	High	1.39	2.79	11944.50*	-.17
Attentional and visuoperceptual capacity	Low	35.94	8.71	Medium	33.98	8.67	16314.00*	.22
		35.94	8.71	High	33.33	9.81	14039.00*	.28
Attention deficit	Low	2.35	2.97	Medium	3.39	3.58	15903.50**	-.31
		2.35	2.97	High	4.52	3.96	11886.50***	-.62
	Medium	3.39	3.58	High	4.52	3.96	12013.50**	-.29
Behavior disorder	Low	2.41	3.72	Medium	3.85	5.23	16583.50*	-.31
		2.41	3.72	High	4.10	5.66	14217.00***	-.35
Hyperactivity-attention deficit	Low	4.69	5.38	Medium	6.23	6.11	16351.50**	-.26
		4.69	5.38	High	7.82	6.90	12842.00***	-.50
	Medium	6.23	6.11	High	7.82	6.90	12530.00*	-.24

*** $p < .001$; ** $p < .01$; * $p < .05$
 Source: Compiled by the authors

Multiple regression analyses

Finally, two multiple regression analyses were conducted to analyze which variables were predictive of school stress and overall stress. Results are presented in Table VI, indicating that in both cases, stress was predicted by the attention deficit variable, explaining 9.6 % of the total variance of school stress, and in the case of overall stress, 6.1% of the total variance was explained. This variability may be significant (even though the percentage is not high), given the importance of these variables in child development.

TABLE VI. Results of the regression analysis with school stress and overall stress as criterion variables

	<i>R</i>	<i>R</i> ²	<i>Adjusted R</i> ²	Durbin-Watson	<i>F</i>	<i>gl</i>	B	ET	β	<i>t</i>
<i>School stress</i>										
Attention deficit	.312	.098	.096	1.88	49.97***	1,544	.11	.02	.29	7.07***
<i>Overall stress</i>										
Attention deficit	.248	.061	.061	1.85	35.48***	1,544	.23	.04	.25	5.89***
*** <i>p</i> < .001										

Source: created by the authors

Discussion / Conclusions

In the educational context, an abundance of studies have focused on cognitive and executive processes that predispose or interfere in learning, as well as in students' psychological and personal well-being, at any stage of education (López-Pereyra et al., 2021; Trigueros et al., 2023). All this takes on greater importance under the educational neuroscience paradigm, which encompasses a broad range of variables related to the learner's mental health (Martínez-Cienfuegos, 2020). Based on these ideas and recognizing that there is no consolidated theoretical framework that contributes scientific, empirical evidence of the relations between cognitive variables—attentional processes among them—and other psychology variables such as children's daily stress, the present study sought to analyze relationships between these variables in fifth- and sixth-graders.

In response to the general objective of analyzing relations between attentional and inhibitory control processes and daily stress, the results confirmed the tendency that students with higher levels of daily stress, in general, as well as stress related to health, family and particularly to school, were the

students who showed greater attention deficit in class, greater behavior disorders, and in general, higher levels of attention deficit with hyperactivity. On the other hand, higher levels of selective and sustained attention, better attentional and visuoperceptual capacity, and better impulsivity control, were observed in the students who presented lower levels of school stress, as well as overall stress.

The second objective was to verify whether there were differences in attentional and inhibitory processes according to different levels (low, medium and high) of school stress and overall stress. The results reaffirm that the students with higher levels of school stress were those with higher scores in attention deficit, behavior disorders, and attention deficit with hyperactivity. Moreover, students with low levels of overall stress presented better selective and sustained attention, as well as better attentional and visuoperceptual capacity, in comparison to those with high levels of overall stress. The latter group equates with those who, based on teacher reports, scored higher in attention deficit, behavior disorders and attention deficit with hyperactivity. Consequently, as has been demonstrated previously, we confirm that children with higher scores in daily stressors have lower attentional capacity (Maldonado et al., 2008). It is possible that stress level has a direct relationship with attention deficits or problems that may interfere substantially in a child's development, affecting their daily life, in its personal, psychological, academic, and relational aspects. In short, these results reinforce what others have reported in recent years, where direct relationships were found between certain negative attitudes in the school context, and children's daily stress, and these are linked, for example, to attention deficit, and consequently to lower levels of cognitive and academic performance (Martínez-Vicente et al., 2023; Torres et al., 2014; Trianes et al., 2012; Valiente-Barroso et al., 2024). This situation thus explains how high levels of stress result in lower achievement. Consequently, keeping these relationships in mind, empirical research in this matter constitutes the foundation upon which to justify teaching and educational practices that aim to redirect and mitigate the effects of these deficiencies or difficulties on learning. In the educational context, therefore, being alert and observant of each student is foremost. Low attention and concentration may be psychological symptoms that are being produced as a con-

sequence of stress, the latter being understood as the set of everyday, frequent events that may interfere in the student's normal development.

Finally, a regression analysis was carried out in which attention deficit was seen to predict stress in the school environment, as well as stress overall. These results fall in line with previous studies that call for recognition of the influence of a wide range of variables—including cognitive, affective, and motivational factors—on both the actual and perceived health of learners. They suggest that in an educational context, it is essential to develop all these skills, including attentional skills, which are closely linked to academic abilities themselves (Sáinz et al., 2012; Valiente et al., 2020a).

This study allows us to identify and underscore certain problems which teachers must be aware of. Namely, children may be affected by everyday stressful situations, and specifically those in the school context itself, which then become risk factors that may visibly impact their functioning (Bruguera et al., 2017). Nonetheless, as Morales and Trianes point out (2012), we must bear in mind that these stressors may act as protectors in certain cases, because they trigger and develop coping mechanisms that are not available by any other means. We must consider that childhood exposure to moderately stressful situations can buffer against harmful effects from typical stressors in later stages like adolescence (Shapero et al., 2015).

As for the limitations of this study, we point to its cross-sectional nature, where the data is gathered at a single point in time, not allowing us to see the evolution of the data over time. A longitudinal design could provide better assurance of these study conclusions, specifying the directionality of the relations between children's daily stress and students' attention problems. Moreover, non-random sampling may imply the presence of many extraneous variables. Another limitation is the use of self-reports to gather information, since they may add in the social desirability effect. However, in the field of education, questionnaires are among the instruments most used for collecting relevant information, as long as conditions of validity and reliability are ensured. Regarding the instruments used, the *EDAH* should also be completed by other teachers who deal with students in the classroom, not only the home-room teacher, in order to contrast the information collected. Finally, another limitation is the lack of prior research that incorporates these study variables,

making it important to continue in this line of investigation. Future research might also consider other variables that may mediate in this relationship, for example self-esteem, motivation, and emotional intelligence, and the age range could be expanded to consider compulsory and college-preparatory stages of secondary education.

In short, from an applied perspective, these results highlight the importance of the relationship between attentional processes and other behavioral or affective processes that affect health, such as stress. These are determining factors for proper school adaptation and successful coping with typical situations of everyday life. Studies such as this one are necessary to provide empirical evidence for disciplines like positive psychology, where the emphasis is placed on these youngsters' strengths, because these are determining factors in their optimal personal and mental development. Hence, the need to promote actions that improve well-being and personal development, within the educational sphere. In this regard, the importance of cognitive training has outgrown its restriction to the clinical sphere, now emerging under a broad umbrella of possibilities within the sphere of education. We emphasize the interaction of genetic and environmental factors, and propose interventions that support processes of maturation and development of the executive attention network. These interventions to optimize attentional processes through attention training-based activities, are also under consideration for transfer to other skills of emotional and behavioral self-regulation. Such skills have significant repercussions on the student's overall development at any stage of education (Juárez-Ramos & Fuentes-Canosa, 2018). In conclusion, we call for teaching actions that, upheld by the educational neuroscience paradigm, are focused on improving executive and cognitive competencies, as well as optimizing diverse variables that define students' psychological profile.

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Evaluation of the Teacher Professional Development System on Student Results in Chile

Evaluación Del Sistema De Desarrollo Profesional Docente Sobre Los Resultados De Los Alumnos en Chile

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Resumen

Durante el año 2017 entró en vigor la Ley N°20.903, la cual modifica el Estatuto de Profesionales de la Educación, implementando el Sistema de Desarrollo Profesional Docente (SDPD) en el Sistema Educacional Chileno. Entre las modificaciones introducidas se encuentra un sistema de incentivos económicos a los docentes que pertenecen al sistema público, el cual puede llegar a modificar sustancialmente sus remuneraciones. El postulado bajo el cual se basa este incremento radica en reconocer la importancia social de la labor docente y la teoría de los incentivos. En este sentido, la evidencia internacional apunta en una relación directa entre el salario de los docentes y los resultados de sus alumnos durante su trayectoria escolar en evaluaciones estandarizadas. Mediante una estimación de diferencias en diferencias, con datos de la prueba SIMCE de lenguaje y matemáticas de las cohortes 2016 y 2018 aplicadas a los alumnos de cuarto año básico y sexto año básico a nivel nacional, respectivamente, se analizó el impacto de la política de incentivos derivada del Sistema de Desarrollo Profesional Docente a los profesores del sistema público, en contraste a los del sector particular subvencionado. Es así como para diversas estimaciones se obtienen resultados nulos o negativos sobre los resultados de los alumnos en pruebas estandarizadas, cuyos profesores son parte de la política analizada, evidenciando un efecto más robusto estadísticamente en los casos que la variable de resultado es la evaluación de matemáticas. Luego de revisar los resultados de los diferentes modelos de estimación, parece pertinente mantener un monitoreo respecto a los efectos de la política y sus incentivos generados a los docentes, además de incorporar la visión de estrategias similares en otros sistemas, por ejemplo, los casos de incentivos por rendimiento que no son permanentes y son evaluados constantemente para mantenerlos y renovarlos.

Palabras Clave: Incentivos; Resultados Académicos; Salarios; Política Pública; Evaluación.

Abstract

In 2017, Law No. 20,903 came into force, to modify the Statute of Education Professionals, implementing the Teacher Professional Development System (SDPD) in the Chilean Education System. Among the modifications introduced is a system of economic incentives for teachers who belong to the public system, which can substantially modify their remunerations. The system is based on recognizing the social importance of teaching work and the theory of incentives. In this sense, international evidence points to a direct relationship between teachers' salaries and the results of their students during their school career in standardized assessments. Through a difference-in-differences estimation, with SIMCE language and mathematics test data of the 2016 and 2018 cohorts applied to fourth-grade and sixth-grade students nationwide, respectively, the impact of the incentive policy derived from the Teacher Professional Development System on teachers in the public system was analysed, in contrast to those in the subsidized private sector. Thus, for various estimates, null or negative results are obtained on the results of students in standardized tests, whose teachers are part of the analysed policy, evidencing a more statistically robust effect in cases where the result variable is the mathematics evaluation. After reviewing the results of the different estimation models, it seems pertinent to maintain monitoring regarding the effects of the policy and its generated incentives for teachers. In addition, it is important to incorporate insights from similar strategies implemented in other systems, for example, the cases of performance incentives that are not permanent and are constantly evaluated to maintain and renew them.

Key words: Incentives; Academic Achievement; Wage; Public Policy; Evaluation.

Introduction

Good teachers matter—there is no doubt about that. Several studies show that high-performing teachers can significantly influence student outcomes in standardized tests (Fryer et al., 2018).

There are diverse strategies to ensure that the best teachers are present in schools; one of them is to “hire the best.” While this may seem like an obvious approach, in practice it is not, as identifying the best teachers “ex-ante” is not a simple task. A second approach involves investing in human capital improvement through training. In this regard, since the implementation of the Preferential School Subsidy (Subvención Escolar Preferencial - SEP) in Chile—which aims to provide increased resources for vulnerable students—funding for this purpose has grown.

A third approach is to associate incentives with teachers, aiming to improve their performance. This policy approach constitutes the core focus of the present study.

The diversity of strategies implemented across education systems globally makes the evaluation of its impact and relevance necessary, once a course of action is chosen.

The general objective of this study is to assess whether the implementation of a Teacher Professional Development System (Sistema de Desarrollo Profesional Docente - SDPD), initiated in Chile in 2017, influences students' academic performance in standardized tests.

The first section of the study contextualizes the issue by examining historical student performance in standardized assessments, considering the administrative dependence of schools. This is followed by a conceptual definition of the Incentive Theory and the characterization of the structure of the SDPD (Teacher Career Path).

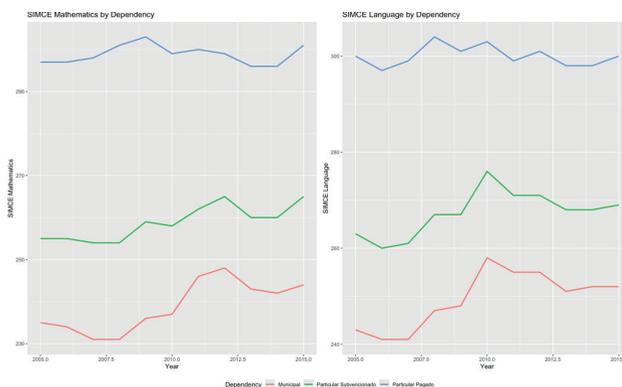
The next section presents the methodology, the data analysis and policy evaluation. Followed by the analysis of results which includes a descriptive characterisation of the students and teachers who are part of the policy, and an impact assessment of the policy.

Finally, the study concludes with key findings and proposals for possible extensions of the work.

The Chilean School System and Incentives

The persistently low performance of Chilean municipal schools in standardized assessments is a regrettable constant within the education system. When analyzing the evolution of SIMCE results (a standardized test administered at various educational levels across Chile), both in mathematics and language, it is evident that private and subsidized private schools consistently outperform municipal schools year after year, as shown in Graph 1:

FIGURE I: Evolution of SIMCE Scores – 4th Grade



Source: Compiled by the authors, based on data from the Education Quality Agency.

There are multiple explanations for this phenomenon, including students' socioeconomic background and vulnerability, the rural nature of many schools, the selective admission capacity of private and subsidized private institutions, and the quality and incentive structure of teachers.

As such, several public policies have aimed to improve teacher quality, allocating significant resources to professional development programs, including training in curriculum evaluation, pedagogy, and other areas. However, at least within the municipal sector, these initiatives appear to have fallen in terms of improving student learning outcomes.

Consequently, in 2017, Chile implemented the Teacher Professional Development System (SDPD) within its education system—a reform that, to date, lacks comprehensive evaluation regarding its impact on student outcomes.

Incentive Theory

Unlike the so-called “Exact Sciences,” the Social Sciences deal with individuals who make decisions influenced by beliefs, personal circumstances, others behaviour, among others. This makes difficult to predict behaviours, highlighting the need for an analytical framework about decision-making processes and outcomes prediction of those decisions.

Failing to consider incentives in individual decision-making can lead to completely misguided predictions of behaviour. A clear example is the British colonization of India, where one of their greatest challenges was not

military resistance, but venomous cobras— This gave rise to the so-called ‘cobra effect.’ (Sala-I-Martín, 2019).

With respect to incentive theory, a significant contribution comes from principal-agent model, where the teacher (agent) focuses their efforts on tasks that are evaluated and rewarded by the principal, neglecting those that are not subject to economic incentives (Holmstrom & Milgrom, 1991).

On the other side, the perspective of efficiency wage schemes assumes that individuals (including teachers) seek to maximize their welfare, leading problems for principals agency, particularly when information is asymmetric. These issues can be mitigated through contracts that evaluate performance— such as student results on standardized assessments or student pass rates— and implement efficient incentive systems (Holmström, 1979).

Furthermore, by introducing the possibility of higher salaries based on teacher performance, allows a competitive “market” for highly qualified individuals interested in public positions, as long as the salaries are attractive to comparable positions in the subsidized or private sectors. Recruiting highly efficient teachers would enhance school management by attracting talent to the municipal/public sector and encouraging self-selection dynamics. This scenario activates mechanisms such as signaling, the value of certifications (academic degrees and their origin), and the pursuit of returns on these credentials, among others.

In terms of contract design, proposing a greater emphasis on performance-based pay and a reduction in fixed salary components leads to a linear salary function of the form:

$$y(x) = k + mx \quad (1)$$

where “k” is the base component and “m” represents the variable component dependent on goal achievement (x). This formula seeks to reduce moral hazard in management by increasing the “penalty” for deviating from the objectives set by the principal (Dixit, 2002).

A well-structured incentive system can certainly predict better teacher performance. However, this should not come at the expense of monitoring other elements outside the incentive scheme design that still affect students, such as school climate and student well-being.

International Evidence

There is broad consensus regarding the importance of education as one of the main drivers of national development. Some development models even place human capital at the centre of the development leap that countries can make. In this regard, Gary Becker (1993) argued that economic growth can be explained not only by the physical and financial capital, but also by the incorporation of scientific and technological advancements to improve productivity, making human capital a key component. Today, Becker's proposals are fully accepted, with human capital now integrated into formal development models (Barro & Sala-I-Martin, 2018). In this context, it is crucial to understand the relationships embedded in the economics of education for public policy decision-making.

A main concern for the economics of education has been identifying the factors that explain student performance on standardized assessments. Evidence shows that if students with similar baseline skills and knowledge are taught by teachers of different quality—one high-performing and the other low-performing—after three years, significant differences will emerge in their learning outcomes (Barber & Mourshed, 2007). Thus, factors such as the selectivity of entry into teacher superior education programs, average per-student expenditure, and teacher salaries all feed into a production function that helps explain both, teacher performance and student achievement.

Regarding teacher salaries, this variable is clearly related to the kind of professionals who are drawn to the teaching profession—both at entry and throughout their career trajectory. Countries with high-performing school systems tend to offer starting salaries for teachers that are above the per capita GDP in their respective contexts (Barber & Mourshed, 2007). This aligns with evidence from Australia, where Leigh (2012) found that increasing teacher salaries promote higher-achieving secondary school students to pursue degrees in education.

The idea of a positive correlation between teacher pay and performance is frequently used in the design of policies aiming to improve student outcomes on standardized tests (Hanushek et al., 2018). These researchers, after analyzing data from 31 countries, concluded that teacher pay is positively correlated with the proportion of high-performing secondary students who choose to become teachers—consistent with Leigh's findings in Australia.

On the other hand, Bueno and Sass (2018), explored whether performance-based bonuses help retain teachers in the system. They found that

higher salaries do make the teaching profession more attractive in terms of retention, but do not generate sufficient incentives for specialization in subjects like mathematics or science, areas that often face teacher shortages.

Contrary to the above, a regression discontinuity analysis conducted in the state of Washington did not find evidence of a causal relationship between economic incentives (bonuses) and significant improvements in student outcomes on standardized tests (Bueno & Saas, 2018).

In the Latin American context, a study using difference-in-differences and triple-difference techniques in public schools in the state of São Paulo, found that an incentive program positively impacted student achievement (Lépine, 2022). Conversely, Bellés-Obrero and Lombardi (2022) evaluated a teacher bonus policy and found no significant effect on the test scores of students whose teachers received the incentive.

Chilean Context

The study of the impact of teacher salaries on student outcomes is not new in the international literature, nor in the Chilean case. In the late 1990s, Patricio Rojas (1998) presented a study concluding the negative impact of low starting salaries on the “teacher labor market” and the limited prospects for salary progression, condition prevalent at the time.

This situation persisted for over two decades, generating academic interest in the topic. In 2015, Eyzaguirre and Ochoa (2015) presented recommendations for designing a career path system for teachers, including the creation of incentive systems to attract better professionals into both, school and early childhood education.

Additional literature follow a similar line. For instance, in the early 2000s, Le-Foulon (2000), identified similar results to Eyzaguirre and Ochoa fifteen years later, regarding the need to modify the design of the incentive system. Meanwhile, Bravo, Flores, and Medrano (2010), identify that teachers’ greater skills are recognized monetarily in the subsidized private sector, but not in the municipal sector.

From a qualitative perspective, studies have explored teachers’ perceptions of their own salaries and their individual impact with a social effect. These studies suggest that teachers’ have lower salary wages, compared to other professionals with similar experience (Acuña Ruz, 2015). This could affect their work performance and student learning.

To sum up, there is substantial consensus in the Chilean academic

community regarding teachers' salary conditions influence their performance and, consequently, student outcomes. This has created pressure to reform teacher compensation structures, ultimately resulting in legal changes focused on the Teacher Statute.

Teacher Professional Development System

In 2017, Law No. 20,903 came into effect, establishing the Teacher Professional Development System (SDPD). It includes significant changes to the Teacher Statute, including the creation of a structured "Teacher Career Path." Among its provisions, the law modifies the incentive mechanism for education professionals (Rivera, 2018) and establishes categories (or "levels") for teachers (CPEIP Ministerio de Educación, 2020).

Article 19 of the Teacher Statute highlights the SDPD's principle to recognize and promote the professional development of educators by providing financial incentives for progression within the system. In addition, it promotes the professionalization of teaching in Chile, emphasizing autonomy, ongoing training, ethical commitment, and responsibility.

In general terms, the SDPD comprises two subsystems: one focused on recognition and promotion of professional development, and another on formative support.

Recognition and Promotion Subsystem encompasses an assessment process (which takes into account teaching experience and competencies) and a progression mechanism through various levels, allowing teachers to access different remuneration tiers.

The assessment process aims to certify that teachers have the necessary disciplinary and pedagogical knowledge for their subject area, with a strong emphasis on classroom experience. In general terms, the Ministry of Education and the Agency for Quality Education employ two instruments for this purpose: the "Evaluation of Specific and Pedagogical Knowledge" and the "Professional Portfolio of Pedagogical Competencies."

The career progression mechanism introduced by the SDPD organizes teachers into levels, which they can attain by demonstrating specific experience, competencies, and skills, along with their performance in various assessment moments (Ministerio de Educación, 2016).

The system establishes three phases of career progression:

- Phase 1 (Mandatory): Includes three levels—Initial, Early, and Ad-

vanced—intended to ensure that teachers reach the competencies required for effective teaching.

- Phase 2 (Voluntary): Includes two levels—Expert I and Expert II—for teachers who seek to further develop their professional skills.
- Phase 3 (Exceptional): Applies to teachers who lack records in the formal evaluation instruments, placing them temporarily in a transitional level called “Access.”

The following table shows how teachers are categorized based on the results of assessment tools:

TABLE I: Category Assignment Based on assessment tools

Portfolio Instrument	Evaluation Instrument			
	A	B	C	D
A	Expert II	Expert II	Expert I	Early
B	Expert II	Expert I	Advanced	Early
C	Expert I	Advanced	Early	Initial
D	Early	Early	Initial	Initial
E	Initial			

Source: Rivera, 2018, p. 310.

Another central component of the SDPD is its new economic incentive structure, accessible to education professionals. The variation in compensation is illustrated in the following example:

TABLE II: Salary Components for a Primary Teacher (44 hours/week and 30 years of service, i.e., 15 biennia). Values in Chilean pesos, 2021.

Level	Component 1 (Experience)	Component 2 (Progression)	Component 3 (Fixed)
Access/Initial	\$325.424	\$14.631	\$ -
Early		\$48.214	\$ -
Advanced		\$97.036	\$ 100.713
Expert I		\$363.779	\$ 139.879
Expert II		\$782.867	\$ 212.616

Source: Compiled by the authors.

Regarding training support, also contained in an amendment to the Teaching Statute made by Law 21,903, its ultimate goal is to generate the conditions for continuous improvement of the teaching function, focusing on training for professional practice, and induction into professional practice.

Additionally, the resources allocated by the Chilean state to special allowances for education professionals increased by 76.13% (in nominal terms), between 2016 and 2018, from CLP 220.6 billion to CLP 388.5 billion (Dirección de Presupuesto, 2020).

The structural reforms introduced by Law No. 20,903 seek to redefine the teacher compensation system, offering a clear career path and salary trajectory for those who choose to dedicate their professional life to teaching. The ultimate goal is to attract talented individuals to the profession and, in turn, improve student learning outcomes.

Currently, the Teacher Career Path is fully implemented in the municipal sector, with gradual expansion into subsidized private education and pilot programs in early childhood education. The policy thus aims to become a cross-cutting reform throughout Chile's primary and secondary education system.

Methodology and Data

Regardless of the instrument or tool used, public policies aim to improve the well-being of a target population through various mechanisms, such as monetary transfers, direct services, and other possible interventions (Gertler et al., 2017).

Undoubtedly, the public policies assessment is a valuable exercise that allows for corrections, redesigns, or even the elimination of policies that fail to achieve their intended objectives.

The need to assess the effects of policy instruments has given rise to policy evaluation, which seeks to determine both, the degree to fulfil goals and the efficiency of public resource use, considering their high opportunity cost. From a quantitative perspective, this process involves impact evaluation (Bernal Salazar & Peña, 2012).

Generally, impact evaluation aims to determine the extent to which a program causes changes in an outcome, defined as the variation between the effects on a treated group and those on a control group not exposed to the intervention:

$$\Delta = (Y | P = 1) - (Y | P = 0) \quad (2)$$

The Difference-in-Differences (DiD) method evaluates changes in outcomes over time between individuals “treated” by a program and those who are not, forming the “control group” (Gertler et al., 2017).

One of the strengths of this method is its ability to control for unobservable individual characteristics that may influence the decision to participate in a program, as well as for exogenous factors such as socioeconomic and contextual variables (Dirección de Presupuesto, 2015).

This method is widely used in public policy and economics, allowing the evaluation of macro policies, school programs, wage changes, and more (Angrist & Pischke, 2015).

One of the earliest applications of the DiD approach was used to evaluate the effect of a minimum salary increase on unemployment in the fast-food industry in two U.S. states. The study concluded that the wage increase did not significantly affect unemployment (Card & Krueger, 1994).

From a formal standpoint, the DiD model can be expressed as:

$$DD = [(\bar{Y}_1|T = 1) - (\bar{Y}_0|T = 1)] - [(\bar{Y}_1|T = 0) - (\bar{Y}_0|T = 0)] \quad (3)$$

This method allows estimation of the impact of the SDPD, under the assumption that test scores for the treated and control groups can be observed and compared over time. This condition is met in the current study, allowing for the identification of the average treatment effect, while acknowledging potential biases from unobserved time-varying variables.

The approach is quantitative, using multiple regression techniques to evaluate the effects of the SDPD on student outcomes in standardized tests—both language and mathematics—before and after policy implementation.

The unit of analysis consists of students who were in 4th grade in 2016 and in 6th grade in 2018, for whom SIMCE results, GPA, average attendance, and other relevant variables are available for both years.

Data Sources

This study uses secondary data from the Chilean Agency for Quality Education, covering students who took the SIMCE in 4th grade in 2016—before the SDPD implementation—and the same students’ performance in 6th grade in 2018—after the SDPD had been introduced. In forward, the 2016 period data is the “pre” and 2018 period is the “post” SDPD.

The datasets include information on student family background, such as socioeconomic status and mother’s educational attainment.

Additional datasets from the Ministry of Education provide information on teachers, student GPAs, and average attendance for both the pre- and post-policy periods.

TABLE III: Summary of Variables Used in the Study

Variable	Description
SIMCE	Scores in the SIMCE Mathematics and Language assessments
GPA	Student’s general grade point average (pre and post)
Treated	Binary variable indicating whether the student’s teacher is part of the SDPD (0 = No, 1 = Yes). The student benefits from the policy when they teacher is treated, taking value 1, or 0 value in contrast.
Period	Indicates whether data is from before (2016 = 0) or after (2018 = 1) policy implementation
Attendance	Student’s average attendance percentage per period
Socioeconomic Group	Categorical variable from parent surveys, with 5 groups: 1 = Low, 2=Middle Low, 3=Middle, 4=Middle High, 5 = High
Mother’s Education	Continuous variable indicating the mother’s years of schooling
Vulnerability Index (IVE)	School’s vulnerability percentage, as determined by JUNAEB
Rurality	Binary variable for school location: 1 = Urban, 2 = Rural

Source: Compiled by the authors.

Treatment and Control Groups

The treatment group consists of students enrolled in public schools (Municipal, Municipal Corporations, or Local Public Education Services) whose administrative status remained unchanged between the two observation periods

(“Before” and “After”). These schools and their teachers were required to participate in the SDPD, making both, the institutions and their students, part of the treated group.

To construct the control group, the full dataset from the Agency for Quality Education and the Ministry of Education was analysed.

First, to eliminate the effect of co-financed schools, only records from tuition-free institutions were retained. Establishments categorized as “Private Paid” and “Delegated Administration” were excluded, the latter being a special category of institutions managed directly by the Ministry of Education.

Next, only students who were present in both 2016 (“Before”) and 2018 (“After”), and whose schools maintained the same administrative dependency, were included. Additionally, only those with valid records for both SIMCE scores and GPA were available. The resulting groups, by time period, are shown in the table below:

TABLE IV: Students by Administrative Dependency and Period

Dependency	Before	After
Municipal Corporation	6.100	6.100
Municipal DAEM	14.534	14.534
Subsidized Private	20.641	20.641
	41.275	41.275

Source: Compiled by the authors.

In terms of policy evaluation and data analysis, the treatment and control groups, by period, are defined as follows:

TABLE V: Treatment and Control Groups by Period

Group	Before	After
Control	20.641	20.641
Treated	20.634	20.634
	41.275	41.275

Source: Compiled by the authors.

Model

The general model used to estimate the difference-in-differences (DiD) corresponds to a multiple linear regression. Its structure is as follows:

$$Y_{it} = \beta_0 + \beta_1 * treated_{it} + \beta_2 * period_{it} + \beta_3 * dif_dif_{it} + \beta_4 * attendance_{it} + \beta_5 * socioeconomic_{it} + \beta_6 * motherEdu_{it} + \beta_7 * ive_{it} + \beta_8 * rural_{it} + \varepsilon_{it} \quad (4)$$

Where Y_{it} corresponds to the dependent variable, which can be the result in the SIMCE test in Mathematics, Language or the General Grade Point Average, depending on the estimation model. $treated_{it}$ corresponds to whether the student's teacher is part of the Teacher Professional Development System. dif_dif_{it} is the interaction variable between period and treatment, which allows evaluating the impact of the Teacher Professional Development System on the outcome variable, being present in all the estimates made, independent of the response variable. This variable corresponds to the double difference estimator and is from which, according to its statistical significance, the impact of the program on the outcome variable is estimated. $attendance_{it}$ is a variable that shows the average attendance percentage of student "i" in each period "t". $socioeconomic_{it}$ corresponds to the value based on the socioeconomic group declared by the student's guardian in the SIMCE survey for each period. $motherEdu_{it}$ indicates how the mother's years of education affect the student's results on standardized tests or their overall grade point average. ive_{it} is the effect of the school's vulnerability on the results. Finally, $rural_{it}$ shows the effect of the school's rurality on the dependent variable.

The subscripts "i" and "t" represent the individual (student) and the period (before/after).

Results

Before reviewing the estimation results and the impact of the SDPD, it is important to analyse certain statistics that are relevant for understanding the characteristics of both, the treatment and control groups.

In general terms, the control group shows higher performance than the treatment group in standardized assessments, as well as in overall GPA, class attendance, and mother's level of education. This reflects the documented

performance gap between public and subsidized private schools in the Chilean education system.

TABLE VI: Means of Quantitative Variables

Variable	Control Before	Control After	Treated Before	Treated After
SIMCE Math	263,3 (45,2)	250,9 (46,1)	251,1 (46,5)	236,7 (45,8)
SIMCE Language	267,2 (48,6)	250,6 (49,9)	257,6 (50,9)	240,5 (50,9)
GPA	5,9 (0,48)	5,7 (0,5)	5,9 (0,5)	5,8 (0,6)
Attendance	93,8 (5,3)	94,1 (5,4)	93,4 (5,8)	93,7 (5,9)
Mother's Education	11,7 (3,0)	11,6 (3,1)	10,6 (3,2)	10,6 (3,3)
Observations	20.641	20.641	20.634	20.634
Std. Error	0,3	0,3	0,3	0,3

Source: Compiled by the authors.
Note: Standard deviations in parentheses.

Estimation of the SDPD Impact

The impact of the Teacher Professional Development System (SDPD) on student outcomes—measured by the SIMCE Mathematics and Language test scores—is estimated through four models. The first model includes the effect of being treated, the period, and their interaction.

The second model incorporates the effect of average class attendance. The third model includes the student's socioeconomic status and the mother's level of education. Finally, the fourth model introduces contextual variables such as the school's vulnerability index (IVE) and rurality.

The first estimation for SIMCE Mathematics results shows a marginally negative impact of the policy with high statistical significance. When attendance is included (Model 2), the previous trend remains, and the expected effect of higher attendance—i.e., improved outcomes—is confirmed, with all estimators showing strong statistical significance.

In the third model, the coefficient for the difference-in-differences estimator becomes more negative than in previous models, though the magnitude remains marginal in the context of the test score scale. Furthermore, higher socioeconomic status is associated with better student performance, though in the highest segment, the coefficient is not statistically significant.

There is also evidence of a strong relationship between the mother’s educational level and the child’s likelihood of attending school regularly and performing better in standardized tests (Cui, Liu, & Zhah, 2019). Similar studies indicate that it is the mother’s, not the father’s, education that has the greatest influence on student outcomes (Hortcsu, 1995).

Finally, by including background variables—such as JUNAEB’s IVE indicator and school rurality—the fourth model offers a more comprehensive view. As expected, the IVE variable shows a negative effect. Interestingly, rural schools show a counterintuitive positive effect compared to urban schools.

TABLE VII: Estimates – SIMCE Mathematics Results

	Model 1	Model 2	Model 3	Model 4
Constant	263,3306*** (0,3196115)	178,697*** (2,668533)	139,283*** (3,007508)	156,966*** (3,608073)
Treated	-12,26354*** (0,4520373)	-11,8672*** (0,4494496)	-4,957422*** (0,4882392)	-5,252403*** (0,4899491)
Period	-12,43031*** (0,451999)	-12,64424*** (.4492856)	-11,35677*** (0,4696307)	-11,66573*** (0,4707623)
Dif_dif	-1,942351*** (0,6392773)	-1,999126*** (0,6353754)	-2,579345*** (0,6654378)	-2,357485*** (0,6652894)
Attendance		0,9019055*** (0,0282353)	0,9692924*** (0,0306588)	0,958575*** (0,0307381)

Socioeconomic				
Medum Low			6,160798*** (0,5220984)	5,95842*** (0,5607943)
Medium			15,96809*** (0,5777593)	13,61195*** (0,7374739)
Medio High			23,93403*** (1,048525)	17,80722*** (1,359901)
High			32,33316 (19,98394)	19,6197 (20,03089)
Mother Education			1,820013*** (0,0560768)	1,806004*** (0,0561321)
IVE				-19,34385*** (2,183219)
Rural				3,394623*** (0,5111698)
Rural				
R²	0,0405	0,0522	0,0922	0,0937
R² Adjusted	0,0404	0,0521	0,0921	0,0935
Observations	82.550	82.549	72.294	72.294

Source: Compiled by the authors.

Note: * p<0.10, ** p<0.05, *** p<0.01. Standard errors in parentheses.

When SIMCE Language is used as the dependent variable, the trends are similar to those observed in Mathematics, as shown in the following table.

TABLE VIII: Estimates – SIMCE Language Results

	Model 1	Model 2	Model 3	Model 4
Constant	267,2071*** (0,3529809)	211,839*** (3,019708)	177,8426*** (3,335187)	186,8694*** (3,998814)
Treated	-9,5999477*** (0,4995565)	-9,361044*** (0,4986785)	-3,38929*** (0,5406021)	-3,904194*** (0,5425049)
Period	-16,57308*** (0,4992028)	-16,72604*** (0,4982228)	-15,37963*** (0,5194969)	-15,50905*** (.5207427)
Dif_dif	-0,5775009 (0,7068239)	-0,6170514 (0,7053462)	-1,716617** (0,7365471)	-1,566848** (0,7363702)
Attendance		0,5896119*** (0,0319372)	0,6295742*** (0,033998)	0,6044654*** (0,0340839)
Socioeconomic				
Medum Low			2,693206*** (0,5783851)	3,842015*** (0,6212097)
Medium			10,39939*** (0,6397369)	10,83046*** (.8163871)
Medio High			18,2853*** (1,161111)	16,84091*** (1,505133)
High			34,1114 (22,01371)	29,18807 (22,06568)
Mother Education			1,967703*** (0,0621063)	1,974446*** (.0621653)
IVE				-9,895658*** (2,415535)
Rural				5,814154*** (0,565819)
R²	0,0366	0,0407	0,0695	0,0711

R² Adjusted	0,0366	0,0406	0,0694	0,0709
Observations	80.448	80.447	71.605	71.605

Source: Compiled by the authors.

Note: * p<0.10, ** p<0.05, *** p<0.01. Standard errors in parentheses.

Discussion and Conclusions

There is broad consensus regarding the crucial role teachers play in the learning processes of their students. A teacher’s performance can significantly influence student achievement.

Education systems have adopted several strategies to ensure the presence of high-performing teachers in schools. These include recruiting the best candidates, offering professional development and training, and implementing economic incentive systems tied to specific performance goals.

The review of international experiences suggests that economic incentive policies for teachers are widely used as mechanisms to improve student outcomes. Although the evidence is not entirely conclusive, it does indicate that this strategy can yield the expected results.

Following several years of debate, Chile implemented the Teacher Professional Development System (SDPD) in 2017. Among other measures, this policy introduced economic incentives for teachers, with the dual aim of improving student learning outcomes and recognizing the social value of the teaching profession, based on international evidence.

Using data from the Agency for Quality Education, the Ministry of Education, and the National Board of School Aid and Scholarships (JUNAEB), a panel dataset was constructed, including observations from **before and after the policy** was implemented. This allowed the identification of a **treated group**, whose teachers were part of the SDPD, and a **control group** whose teachers were not. After estimating various models, the results indicate a **marginally negative or null effect** of the policy on student outcomes in standardized tests—particularly for **Mathematics**. Regarding **Language test results**, similar trends were observed, though with **lower intensity** and **varying levels of statistical significance**.

In addition, the results continue to show achievement gaps across socioeconomic groups, a persistent feature of the Chilean education system—

albeit one that has narrowed slightly in recent years (Centro de Estudios MIN-EDUC, 2013).

The temporal perspective of the policy is also relevant. The SDPD began implementation in 2017 on the public system, with impact measured through standardized assessments conducted in late 2018. That is, the post-treatment period corresponds to the academic year immediately following implementation (with 2016 as the pre-treatment year). This limited timeframe may not fully capture potential changes in teacher performance resulting from the new incentive structure—representing a limitation of this evaluation and the extent to which its findings can inform long-term policy decisions.

It is worth noting that extending the evaluation period was not feasible due to major disruptions in the education system: the 2019 social outbreak and the COVID-19 pandemic in 2020 significantly affected classroom delivery, assessment implementation, and student learning. Recently the education processes returned to some degree of normality, making it possible to conduct future evaluations with a longer policy implementation horizon.

Despite these limitations, the findings of this study suggest the need for ongoing monitoring of the policy, particularly considering its potential impact and fiscal costs.

In this context, it is advisable to conduct follow-up assessments from different perspectives. Beyond future impact evaluations with a longer time horizon, it may also be useful to analyse the policy's administrative and financial implementation.

Moreover, it is important to explore the design of incentive systems. One illustrative case is the United Kingdom's early 2000s model, which offered temporary bonuses to public school teachers who improved their performance, with the possibility of renewing the incentive if improvements persisted or improve (Burgess & Ratto, 2003).

However, any incentive system must consider elements such as moral hazard (related to performance-based rewards) and pre-contract conditions (Fernández, 2005). Therefore, incentives should not focus solely on standardized test results. Recognizing the formative role of teachers in society, incentive structures should also encourage attention to school climate and the holistic development of students, which may involve factors not easily observed or measured.

As a recently implemented policy, the SDPD still requires substantial refinement and consolidation, and resources. In a virtuous cycle of public

policy, it is essential to continue observing the system and to conduct new evaluations to identify corrective actions—ultimately turning the SDPD into a meaningful contribution to the quality of education for Chilean students.

Undoubtedly, the SDPD is still a young policy, which require further development in its implementation, extension and resource requirements. In a virtuous cycle of public policies, it should continue to be observed and evaluated in order to determine corrective actions to become an initiative that contributes to the quality of education for Chilean students.

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Influence of bullying on mathematics achievement

Influencia del acoso escolar sobre el rendimiento en matemáticas

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Abstract

The educational system must guarantee the well-being of students in their school environment through adequate training that makes academic success possible while promoting equal opportunities through integration in scenarios of diversity. Bullying is a global problem that negatively affects adolescents, with consequences that can be long-lasting. The aim of this research is to analyze the factors that increase bullying and examine how bullying affects the academic performance of Spanish students in mathematics. The analysis is done at the national and regional levels by Autonomous Communities. For this purpose, PISA 2018 data for Spain are used. In this study, descriptive and inferential statistics and regression analysis are used to examine the relationships between the variables and estimate the impact of bullying on mathematics proficiency scores, controlling for the influence of other variables related to the characteristics of the student (socioeconomic factors) and the high school. The results

for Spain show that people who suffer bullying have a lower average score in mathematics. Specifically, the regional analysis shows that the effect of bullying on scores is negative and significant in six of them: Catalonia, the Valencian Community, Galicia, the Balearic Islands, the Basque Country, and the Region of Murcia. Excepting the last case, these are regions with two official languages and where the incidence of bullying exceeds the national average. The results of this study provide knowledge about the type of variables that have a greater impact on bullying, which may be useful for promoting educational inclusion. Thus, these results point to the importance of considering linguistic diversity in intervention programs against bullying, along with other factors that increase the heterogeneity of the student body.

Keywords: bullying, mathematics achievement, regression, PISA, educational policy.

Resumen

El sistema educativo debe garantizar el bienestar del alumnado en su entorno escolar, mediante una formación adecuada que posibilite el éxito académico, promoviendo, además, la igualdad de oportunidades a través de la integración en escenarios de diversidad. El acoso escolar es un problema global que afecta negativamente a los adolescentes y cuyas consecuencias pueden ser duraderas. El objetivo de esta investigación es analizar los factores que elevan el *bullying* y examinar cómo el acoso escolar afecta al rendimiento en matemáticas de los estudiantes españoles. El análisis se hace a nivel nacional y a nivel regional, por comunidades autónomas (CCAA). Para ello se utilizan los datos de PISA 2018 para España. En este estudio se hace uso de la estadística descriptiva e inferencial y del análisis de regresión para examinar la relación entre las variables y estimar el impacto del *bullying* sobre la puntuación en la competencia matemática controlando por la influencia de otras variables relativas a características del alumnado (factores socioeconómicos) y del centro educativo. Los resultados obtenidos para España reflejan que las personas que sufren *bullying* tienen una puntuación media inferior en matemáticas. En concreto, el análisis regional muestra que el efecto del acoso escolar sobre las puntuaciones es negativo y significativo en seis de ellas: Cataluña, Comunidad Valenciana, Galicia, Islas Baleares, País Vasco y Región de Murcia. Salvo en el último caso, se trata de CCAA con dos lenguas oficiales y donde la incidencia del *bullying* supera la media nacional. Los resultados de este trabajo aportan conocimiento sobre el tipo de variables que inciden en mayor medida en el *bullying*, pudiendo ser de utilidad para promover la inclusión educativa. Así, estos resultados apuntan a la importancia de considerar la diversidad idiomática en los programas de intervención frente al acoso, junto con otros factores que elevan la heterogeneidad del alumnado.

Palabras clave: acoso escolar, rendimiento en matemáticas, regresión, PISA, política educativa.

Introduction

One of the principal objectives of the educational system is to promote students' well-being in their school environment, not only by offering them teaching that will lead to their academic success but also by integrating and satisfying the needs of all students. This is closely related to the concept of school climate, which refers to the quality of relationships among the participants in the educational system. Although this term is difficult to define and measure, a positive school climate is easy to recognize (Ministerio de Educación y Formación Profesional [MEFP], 2019; OECD, 2019; Schleicher, 2019). Students notice a school environment where they feel integrated and their relationships with other students and teachers are respectful.

Concerning school conviviality, Rodríguez-Muñiz et al. (2022) states the following:

“The study of the relational climate in schools has increased due to the ever more frequent situations and behaviors contrary to conviviality, which add to greater social sensitivity and the increased interest of educational administrations and institutions in providing solutions to these problems.” (p. 2).

Although Spain has a solid regulatory and documental base addressing bullying and conviviality in schools, it does not have any specific regulation to tackle this issue (Cerezo and Rubio, 2017). Law 8/2021, which aims to visualize and correct these types of behaviors, has been an advance in that it establishes the obligation for every school to implement a conviviality plan, accompanied by action protocols to identify and address situations of harassment, abuse, bullying, cyberbullying, and other inappropriate treatment.

Bullying is a problem that affects every country, producing serious consequences for the students who have been bullied. According to Olweus (1994) and Olweus et al. (2019), a pioneer in research on bullying, a person is being bullied when they are repeatedly subjected to negative actions by one or more people, as long as the actions are intentional and there is an imbalance of power between the person who is bullying and their victim. This problem dates back in time, although systematic studies did not begin until the beginning of the seventies. The analysis was initiated in Scandinavia, and

in the following decade, academic and social interest increased in other countries such as Australia, the United States, Japan, and the United Kingdom.

The literature exploring the adverse effects of bullying and the factors that foster it is scarce. In the international context, Ponzo (2013) can be mentioned for Italian students, using data from PIRLS 2006 and TIMSS 2007¹ reports. This author concludes that the benefits of preventing bullying do not only influence educational levels but also equal opportunities since students with lower socioeconomic levels or of different nationalities tend to be victims of bullying more frequently. Ammermueller (2012), using data from TIMSS 2003 for 11 European countries, shows that the student's gender and social and migratory origin influence bullying, and being a victim has a significant negative effect on present and future school performance. Kibriya et al. (2017) use data from the TIMSS 2011 report on students in Ghana, one of the countries with the poorest population and the worst academic performance in the world. Their results show that students who are victims of bullying score lower than their classmates in standardized mathematics tests.

Recently, Yu and Zhao (2021), using PISA data belonging to students from 51 countries and different models, estimated the direct consequences of bullying on academic literacy and social integration. Their results indicate a negative relationship between being a victim of bullying and mathematics achievement.

Among the studies carried out in Spain, García-Continente et al. (2010) use a sample of 2727 students from 66 high schools in Barcelona to examine bullying, considering factors such as age, adverse emotional state, and addictive substance consumption, among others. In their analysis, they explain that boys show slightly higher levels of bullying than girls. They also find a positive relationship between being a victim of bullying and alcohol and tobacco consumption.

The study by Rusteholz et al. (2023) focuses on students from schools in the Community of Madrid. Their results, based on aptitude tests given in 2017, show an increased probability of lower achievement in environments where bullying occurs.

¹ PIRLS: Progress in International Reading Literacy Study and TIMSS: Trends in International Mathematics and Science Study.

Therefore, this is a research line of great relevance. It is necessary to explore the characteristics of the students who are victims of bullying and its repercussions for mathematic performance in order to propose mechanisms and strategies for its prevention and actions to respond to its occurrence. This study focuses on this line. We use data from PISA 2018 for this research. The main objective of this study is to analyze the causal relationship between bullying and the academic performance of 15- and 16-year-old Spanish students (generally in their fourth year of ESO in Spain, which corresponds to the second year of high school in the US). We consider the students' socioeconomic factors that could also influence their performance and other characteristics relevant to their school. The analysis focuses on the scores obtained in mathematics due to its connection to STEM degrees and the significance these have for the students' future job opportunities and economic development. The results for Spain as a whole are compared with those for the country's regions (Autonomous Communities), centering predominantly on three: Catalonia, the Basque Country, and the Region of Murcia. The first two are among the regions with the highest rates of bullying in Spain. The Region of Murcia was selected because it has one of the lowest rates of bullying and also because of its particular characteristics, such as its large immigrant population and the low socioeconomic levels of its students (MEFP, 2019). The analysis also aims to identify the factors related to bullying, which is relevant when planning proposals to reduce its occurrence. The research questions of this study are:

- What is the profile of students most likely to suffer from bullying?
- How does bullying affect students' mathematics achievement?
- Are there differences among regions in the incidence of bullying? Are there differences in the effects of bullying on mathematics achievement?

Methodology

The methodology used is quantitative, descriptive, transversal, and based on information taken from the seventh round of the Program for International Student Assessment (PISA). PISA is a triennial study comparing education worldwide that was first conducted in the year 2000. Its main objective is to discover the abilities and skills of 15- and 16-year-old students, focusing on the assessment of three competences: Reading, Mathematics, and Science. The analysis of this study centers on the mathematics abilities of Spanish students based on the PISA 2018 data.

Variables and sample characteristics

In the seventh round of PISA, 79 countries and 600000 students participated, representing a total of 32 million. In the case of Spain, the sample comprised 35943 students belonging to 1089 high schools distributed among the different regions². In this study, we have considered the sample for Spain and 17 sub-samples corresponding to each of the Spanish regions.

The variables used in this analysis are the mathematics scores (SCORE)³, indicators of bullying, and variables related to the characteristics of the student (socioeconomic factors) and the high school. A particularity of the PISA assessment is that the scores are a relative measure that depends on the results of all the participants. There are no maximum or minimum scores; the results are scaled to a normal distribution, with a mean of 500 points and a standard deviation of 100 points, using the sample of the OECD countries in the year 2000 as a reference (MEFP, 2019).

Different contextual questionnaires directed toward students, families, high schools, and educators are also included in the PISA evaluations. The questionnaire given to the students is quite broad, collecting information about the student's socioeconomic characteristics. PISA began addressing the

² The sample used in this study does not include all the students who participated in the PISA assessment in Spain in 2018 since many of them (around 9,100) chose not to reveal if they had been victims of bullying.

³ The results of the PISA assessment do not consist of one value. For each student, 10 "plausible values" are calculated based on the distribution of the score values the students received. This occurs because, in PISA, students only respond to some of the questions on the test, not to all of them, and it is necessary to estimate how they would have responded to all the questions.

issue of bullying in its questionnaires in 2015, evaluating the frequency, type of bullying, and environment in which it takes place.

Due to the diversity of the information on intimidation and school violence and their different conceptualizations, we have considered various variables to measure bullying. Violent attitudes can be manifested as physical contact (hitting, kicking, etc.), verbal aggression (taunts, threats, and insults), or relational (being excluded from activities, spreading defamatory rumors, etc.). To explore this distinction, we have considered three binary variables, PHYSICAL, VERBAL, and RELATIONAL, which indicate whether each of these three types of bullying has occurred. These variables are generated from the information collected in the questionnaires the students have answered.

These three types of bullying have been combined into a single index (BEINGBULLIED) constructed by the OECD, which reports on students' degree of exposure to bullying. This index has also been taken into account in this study. The index has a mean of 0 and a standard deviation of 1 for the OECD average in the year 2000. When the index shows positive (negative) values, it indicates a higher (lower) rate of bullying than the average of the OECD countries (MEFP, 2019).

In addition to the variables related to bullying, other variables reflecting socioeconomic characteristics are included in the descriptive and econometric analysis. Table I lists and describes all the variables used in the analysis, distinguishing among the socioeconomic characteristics of the student, the characteristics of the high school, and diverse indicators of bullying.

TABLE I. Definition of the variables used in the study

Socioeconomic characteristics of the student	
FEMALE	1= Female, 2= Male.
REPEAT	1= Repeated a grade, 0= Did not repeat a grade.
ESCS	Index of the student’s economic, social, and cultural status. It has a mean of 0 and a standard deviation of 1 for the OECD average in the year 2000. Positive values indicate a higher-than-average socioeconomic level.
IMMIGRANT	1=Native, 2= 2 nd Generation, 3 = 1 st Generation.
ABSENTEE-ISM	Entire days absent from high school in the last two weeks: 1= None, 2= One or two, 3= Three or four, 4= Five or more.
LANGUAGE	Language generally spoken at home: 0= The same as the test, 1= Another.
High school characteristics	
PUBLIC	0= Private and Semi-private, 1= Public
LOCATION	Location of high school determined by population: 1= Rural (fewer than 3000 inhabitants), 2= Town (from 3000 to 14999), 3= Small city (from 15000 to 99999), 4= Medium-sized city (from 100000 to 1000000), 5= Big city (more than 1000000 inhabitants)
Indicators of bullying	
VERBAL	Reflects whether the student has been verbally bullied in the last 12 months: 0= Has not been bullied, 1= Has been bullied.
PHYSICAL	Reflects whether the student has been physically bullied in the last 12 months: 0= Has not been bullied, 1= Has been bullied.
RELATIONAL	Reflects whether the student has been relationally bullied in the last 12 months: 0= Has not been bullied, 1= Has been bullied.
BEINGBULLIED	Index of exposure to bullying. It includes the frequency, during the 12 months previous to the PISA test, with which students had the following experiences at school: Other students “intentionally excluded me”; “made fun of me”; “threatened me”; “took or destroyed my things”; “hit or pushed me”; and “spread malicious rumors about me.”

Source: Compiled by the authors based on PISA 2018 data. (<https://www.oecd.org/pisa/data/2018database/>).

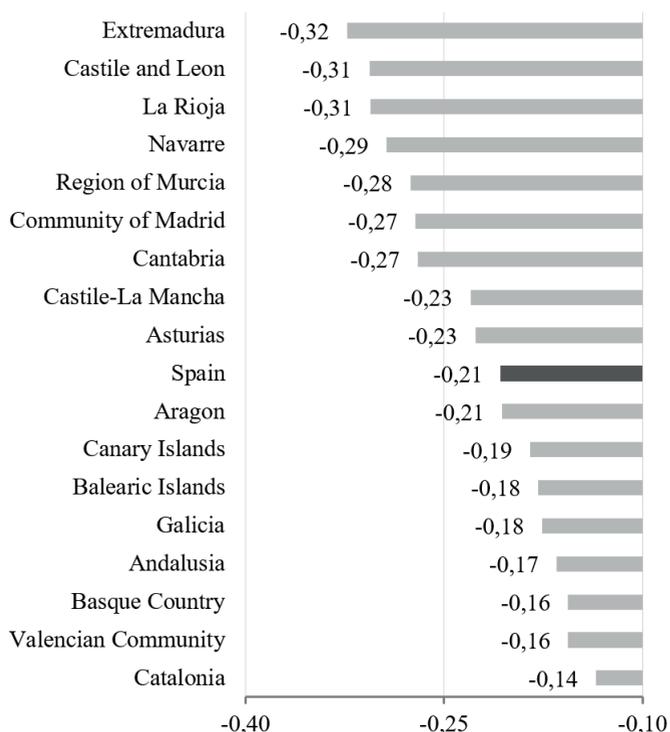
Bullying by regions

Spain is a country with a low rate of bullying, obtaining a value of -0.21 on the bullying index (BEINGBULLIED), which is well below the OECD average. Specifically, it occupies the fourth-lowest position, higher only than the

Netherlands (-0.30), Japan (-0.28), and Portugal (-0.25). In contrast, the highest values belong to New Zealand (0.40), Latvia (0.37), Malta (0.33), and Australia (0.33), MEFP (2019, p. 155).

Figure I shows the average values of the bullying index (BEINGBULLIED) by region. As can be seen, among the regions above the Spanish average, those that have a second official language stand out, such as: Catalonia, the Basque Country, the Valencian Community, the Balearic Islands, and Galicia, in addition to others like Andalusia and the Canary Islands.

FIGURE I. Mean values of the bullying index by region



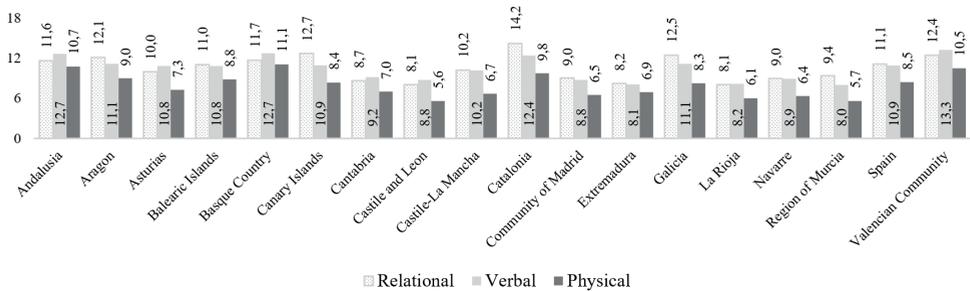
Source: Compiled by the authors

As previously mentioned, bullying can manifest in different ways. Therefore, three types of bullying have been differentiated. Figure II shows the percentages of students subjected to each type of bullying by region. In all

three, Catalonia and the Basque Country exceed the Spanish average, while the Region of Murcia is below the average.

In Spain, the most frequent types of bullying are relational and verbal, with physical bullying occurring slightly less often. This pattern is repeated in the regions, where Catalonia shows the highest incidence of relational bullying. The Valencian Community has the highest rate of verbal bullying, and the Basque Country has the largest percentage of students subjected to physical bullying. In contrast, the Region of Murcia is where physical bullying is the least frequent.

FIGURE II. Percentage of students experiencing bullying by region



Source: Compiled by the authors

Data Analysis

This study focuses on the data obtained for Spain and three regions in particular: Catalonia, the Basque Country, and the Region of Murcia. The first two are among the regions with the highest rates of bullying, while Murcia has the lowest incidence of physical bullying and is one of the regions with the lowest rates of bullying. Table II summarizes the principal characteristics of the sample. As can be seen, Catalonia and the Basque Country are two highly “developed” regions with positive values for Economic, Social, and Cultural Status (ESCS) that are well above the Spanish average, while the Region of Murcia has an ESCS index rating well below the average (in 2018, it was the

region with the lowest level of “well-being”). Murcia also has a larger proportion of immigrants. Catalan and Basque students obtain an average score in mathematics above the national average, while Murcian students’ scores are below average.

TABLE II. Sample characteristics

		Catalonia	Basque Country	Region of Murcia	Spain
Students	Number	1690	3605	1682	35943
	Percentage	4.70	10.03	4.67	100
Score in Mathematics		489.9	499.2	473.6	481.4
Economic, Social, and Cultural Status (ESCS)		0.09	0.08	-0.41	-0.12
% immigrant students	2 nd Generation	6.7	3.1	7.9	4.9
	1 st Generation	7.3	7.2	7.6	7.3
% students who speak a language different than that of the test at home		62.8	13.1	20.6	6.8
% students who have been absent at least one day		34.8	26.0	29.6	33.7
% students who are repeating a grade		15.1	20.0	34.6	28.7
Index of bullying		-0.14	-0.16	-0.28	-0.21

Source: Compiled by the authors

The data analysis has been performed using the RStudio software package *Intsvy* (Caro and Biecek, 2017)⁴. The first part of the analysis uses descriptive and inferential statistics to calculate the means of the variables for the different groups of individuals. The objective is to compare the mathematics scores of the students who have been bullied (relational, verbal, or physical) with those who have not. We also examine the relationship between bullying and each of the factors that influence it. Ammermueller (2012) and Yu and Zhao (2021) show that among the factors affecting bullying are aspects such as the student’s gender, socioeconomic status, absenteeism rate,

⁴ This package facilitates a data analysis considering the design of the PISA sample (with replicate weights) and the 10 “plausible values” that are used to measure the achievement of each student.

having repeated a grade, and being an immigrant or a descendant of immigrants. These factors are analyzed in this study.

The second part uses a multiple regression analysis to examine the effects of bullying on mathematics scores, considering the characteristics of the student and the high school. The equation, estimated using Ordinary Least Squares (OLS), is the following (1):

$$\text{SCORE}_i = \beta_0 + \beta_1 \text{BEINGBULLIED}_i + \beta_2 \text{ESCS}_i + \beta_3 \text{REPEAT}_i + \beta_4 \text{IMMIGRANT}_i + \beta_5 \text{LANGUAGE}_i + \beta_6 \text{FEMALE}_i + \beta_7 \text{ABSENTEEISM}_i + \beta_8 \text{PUBLIC}_i + \beta_9 \text{LOCATION}_i + \varepsilon_i \quad (1)$$

where the subscript i refers to each student, and SCORE is the PISA 2018 mathematics score. The regressors of the model are the bullying index (BEINGBULLIED) and the control variables defined in Table I. Following previous studies, variables referring to the student and high school have been chosen as control variables (Ponzo, 2013; Kibriya et al., 2017). These variables are the socioeconomic level (ESCS), repeating a grade (REPEAT), the country of birth (IMMIGRANT), the language spoken at home (LANGUAGE), gender (FEMALE), the rate of absenteeism (ABSENTEEISM), whether the high school is private or public (PUBLIC) and the location of the high school (LOCATION).

Results

Statistical analysis

Before analyzing the influence of bullying on achievement, it is useful to examine the correlation between bullying and other pertinent factors related to students⁵.

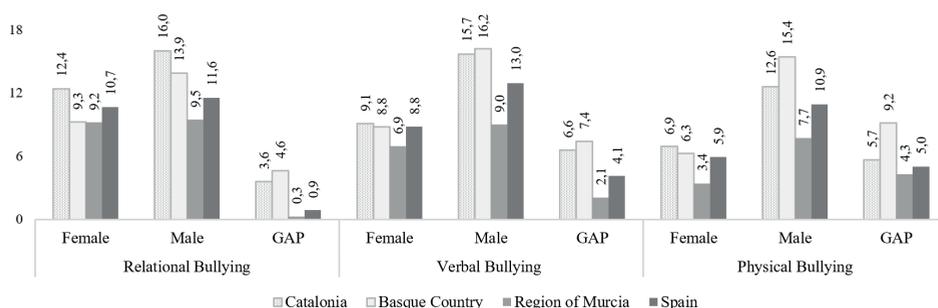
⁵ The relationship between bullying and high school characteristics (PUBLIC and LOCATION) was also examined. The results show very little relationship among these variables. These results are available upon request.

Factors influencing bullying

Examining the incidence of bullying in terms of gender (Figure III), it can be seen that boys are more often implicated in situations of bullying than girls. Therefore, the difference or gap between them is always positive. This could be due to the fact that women tend to prioritize prosocial behavior over antisocial behavior more than men do.

In general, gender inequality in all the types of bullying is lower in the Region of Murcia, while the Basque Country shows a larger difference between women and men, especially in physical bullying.

FIGURE III. Percentage of students experiencing any type of bullying by gender and GAP



Source: Compiled by the authors

Among the female students, there is always a preponderance of relational bullying. In contrast, no uniform pattern is observed among male students, showing more variability. This is reflected in less gender inequality in relational bullying. In fact, in the Region of Murcia and the national average, men and women show values that are practically the same. However, this gap is greater in the case of physical bullying.

Another aspect that can be relevant in bullying is the student's social, economic, and cultural context. To address this question, Table III shows the mean values of the socioeconomic index (ESCS) for students who have been bullied (relational, verbal, or physical) and those who have not.

TABLE III. Mean values of the ESCS index by type of bullying

		Catalonia	Basque Country	Region of Murcia	Spain
RELATIONAL BULLYING	Not bullied	0.18	0.10	-0.36	-0.06
	Bullied	-0.03	-0.06	-0.68	-0.25
VERBAL BULLYING	Not bullied	0.21	0.08	-0.38	-0.06
	Bullied	-0.22	0.10	-0.49	-0.27
PHYSICAL BULLYING	Not bullied	0.18	0.08	-0.37	-0.07
	Bullied	-0.16	0.08	-0.79	-0.25

Source: Compiled by the authors

Table III indicates that being a victim of bullying is related to students' socioeconomic context, which means that young people in less advantaged economic situations are more at risk of being intimidated. Spain, Catalonia, and the Region of Murcia show considerably lower values of the ESCS index for the group of students experiencing any type of bullying. The case of the Basque Country is noteworthy since there is no distinction in the ESCS index in the cases of verbal and physical bullying.

The rest of this section centers on the bullying index (BEINGBULLIED). We analyze its relationship to other student characteristics (immigration and repeating a grade, absenteeism, and language spoken at home). Table IV shows that there is a relationship between these individual student characteristics and the frequency with which they are exposed to bullying.

As can be seen, students who are immigrants are more exposed to bullying than native students. Both second- and first-generation immigrants have indexes with values close to 0. For Spain and the Region of Murcia, first-generation immigrants (born outside of Spain) are the most affected. However, in Catalonia and the Basque Country, second-generation immigrants (born in Spain to immigrant parents) are more vulnerable to bullying.

Another important factor related to immigration is the influence of the language students speak at home on bullying. Linguistic differences have an effect on bullying since students who speak a different language at home than

that of the achievement test experience greater intimidation. Table IV shows that the causal effect is notable since the index for the average in Spain varies from -0.24 to 0.06, a value close to the OECD average. In the case of the Region of Murcia, this difference is even greater since it goes from the region with the lowest incidence of bullying among the students who speak the same language at home as the test (Castellano) to receiving the highest value (0.11) among students who speak a different language at home. However, these differences are not so pronounced in Catalonia, where the language used for the PISA test is Catalan, the co-official language, since the language spoken at home can be Castellano⁶.

The rate of absenteeism and repeating a grade are two other aspects related to bullying (Table IV). Students who are absent from class more often and those who repeat a grade show higher values in the bullying index.

TABLE IV. Mean values of the bullying index by student characteristics

		Catalonia	Basque Country	Region of Murcia	Spain
IMMIGRANT	Native	-0.15	-0.18	-0.31	-0.22
	2 nd Generation	-0.01	-0.01	-0.15	-0.12
	1 st Generation	-0.11	-0.09	-0.04	-0.07
LANGUAGE	Official language of test	-0.20	-0.18	-0.30	-0.24
	Other	-0.10	0.04	0.11	-0.06
ABSENTEEISM	Never	-0.28	-0.24	-0.32	-0.29
	Once or more times	0.11	0.10	-0.19	-0.03
REPEAT	No	-0.20	-0.19	-0.34	-0.27
	Yes	0.25	-0.02	0.15	-0.03

Source: Compiled by the authors

Bullying and mathematics achievement

After examining the relationship between bullying and different aspects related to students and high schools, we examine whether this problem affects stu-

6 Basque students can take the PISA test in Euskera or Castellano.

dents’ performance in mathematics. To do this, we consider the mathematics scores (SCORE) obtained in PISA 2018. Table V shows the mean and standard deviation (in parentheses), differentiating between students who have experienced bullying (relational, verbal, or physical) and those who have not. We also calculate the t-statistic to compare the equality of the means between the two groups.

TABLE V. Mathematics scores by type of bullying

		Catalonia	Basque Country	Region of Murcia	Spain
RELATIONAL BULLYING	Not bullied	497.44 (89.06)	505.77(84.57)	485.02 (87.33)	491.43 (86.52)
	Bullied	450.39 (85.58)	458.06(90.47)	427.36 (94.03)	446.29 (88.66)
	t-Statistic	5.93***	7.87***	7.21***	25.66***
VERBAL BULLYING	Not bullied	497.23 (88.22)	504.03 (85.16)	482.05 (88.81)	490.37 (86.48)
	Bullied	450.84 (90.63)	475.65 (88.96)	449.54 (94.29)	454.79 (91.89)
	t-Statistic	5.47***	4.90***	3.84***	20.16***
PHYSICAL BULLYING	Not bullied	495.05 (88.78)	504.76 (85.71)	482.81 (88.17)	490.05 (86.69)
	Bullied	453.15(94.45)	460.3 (83.92)	428.91 (92.89)	447.34 (92.35)
	t-Statistic	4.42***	7.16***	5.37***	21.41***

Note: *, **, *** indicate significance at 10%, 5%, and 1%, respectively.

Table V shows that the differences in scores among students who have not been bullied and those who have are significant for the three types of bullying and the four samples. This difference is greater in the cases of relational and physical bullying. These results align with the analysis by Yu and Zhao (2021), who find that verbal bullying has less impact on academic achievement.

Econometric analysis

In this section, we estimate an econometric model to quantify the effect of

bullying on mathematics achievement after controlling for student and school characteristics. We estimate equation (1) using OLS. The dependent variable is the mathematics score (SCORE). To evaluate the impact of bullying, we use the bullying index (BEINGBULLIED) as a continuous treatment variable. The control variables, defined in Table I, refer to both the student and the high school.

This model has been estimated for Spain and each of its regions. Table VI shows the results for Spain and the three selected regions: Catalonia, the Basque Country, and the Region of Murcia. Table VII shows the estimated coefficient of the variable BEINGBULLIED for the rest of the regions.

The results in Table VI show that bullying has a negative effect on mathematics achievement. Spain and the regions studied obtained a significant (at least 10%) and negative coefficient. This indicates that, *ceteris paribus*, an increase in the bullying index would worsen performance in mathematics. At the national level, maths scores fall by an average of 4.7 points, with Catalonia showing the largest decrease, 10.8 points.

Although the Region of Murcia does not have a high value of BEINGBULLIED (see Figure I), we can see that this variable is relevant for explaining mathematics achievement. This indicates that even though the rate of bullying among Murcian students is relatively low, its impact on maths scores is significant.

With regard to the control variables, the effect of the socioeconomic index (ESCS) is notably positive and highly significant in the three selected regions and in Spain as a whole, where an increase of one standard deviation in the index is associated with an increase of 14.4 points, *ceteris paribus*. This effect is weaker in the Region of Murcia and the Basque Country, while in Catalonia, it is substantially stronger, with an average increase of 22 points.

The rest of the variables related to students' characteristics have a negative impact on mathematics achievement. Repeating a grade (REPEAT) is the variable that has the strongest negative influence on the mean score in mathematics in addition to being highly significant. For Spain, *ceteris paribus*, it causes a decrease of 85.2 points. For the Region of Murcia, the decrease is even greater, 93 points.

TABLE VI. Results of the regression analysis

Dependent V.: SCORE	Catalonia	Basque Country	Region of Murcia	Spain
CONSTANT	514.0*** (17.5)	557.9*** (11.7)	539.8*** (16.8)	536.9*** (6.1)
BEINGBULLIED	-10.8*** (3.6)	-5.9** (2.5)	-5.3* (2.9)	-4.7*** (1.4)
ESCS	22.0*** (4.1)	12.3*** (2.8)	12.7*** (2.6)	14.4*** (1.2)
REPEAT	-74.7*** (12.1)	-84.3*** (7.4)	-93.0*** (6.0)	-85.2*** (3.1)
IMMIGRANT	-3.2 (7.1)	-17.9*** (5.4)	-3.0 (5.4)	-5.8*** (2.2)
LANGUAGE	-5.0 (7.5)	-3.8 (6.7)	-16.3 (14.1)	-4.5 (3.2)
FEMALE	-8.0 (7.1)	-9.8* (5.5)	-20.4*** (4.1)	-16.4*** (2.2)
ABSENTEEISM	-10.1* (5.4)	-11.8*** (3.8)	-9.2*** (3.0)	-12.0*** (1.6)
PUBLIC	-2.2 (9.9)	-7.7 (6.5)	-2.5 (6.6)	-0.6 (3.0)
LOCATION	3.8 (3.5)	1.4 (2.7)	1.8 (4.1)	2.1* (1.1)
R-Square	0.2*** (0.04)	0.3*** (0.03)	0.4*** (0.02)	0.3*** (0.01)

Note: The standard deviations are in parentheses. *, **, *** indicate significance at 10%, 5%, and 1%, respectively.

The country where the student was born also has a negative repercussions for mathematics scores, although this variable is only relevant for Spain and the Basque Country. The difference in scores between native students and immigrants is greater for the Basque Country. The language students speak at home does not appear significant for explaining mathematics achievement in Spain or the selected regions. This result may be due to the existence of multicollinearity caused by the close relationship between the variables LANGUAGE and IMMIGRANT since most of the students who speak a different language at home than that of the test come from immigrant families. In Spain, only 16% of the native students speak a different language at home than that

of the test, while the percentage rises to 51.6% in the case of 1st generation immigrants.

Another factor that can influence mathematics scores is the gender of the student since, on average, women obtain lower maths scores than men (Tao and Michalopoulos, 2018; Fuentes and Renobell, 2020). In the Region of Murcia, this effect is quite pronounced since the mean score for girls is 20.4 points lower than that of boys, *ceteris paribus*. In the case of Spain, the difference in scores between girls and boys is slightly smaller (16.4 points). In Catalonia, this variable is not significant. Therefore, gender might not affect maths scores among Catalan students.

School absenteeism has a negative and significant coefficient in Spain and in the selected regions. *Ceteris paribus*, Spanish students who are absent more frequently obtain a lower mean score in maths than those who usually go to class. This relationship is clear since students with high absenteeism rates interrupt their learning and miss the opportunity to participate in pedagogic activities, which impedes their learning process.

In contrast, the variables associated with the characteristics of the high school seem not to explain mathematics achievement. As can be seen in Table VI, whether a school is public or private is not significant in Spain or the three selected regions. The variable LOCATION is also not significant for the three regions, while it is significant at 10% for Spain. By showing a positive coefficient, we can say that *ceteris paribus*, as the population grows, the average score in mathematics increases, although this increase is small (2.1 points).

TABLE VII. Estimated coefficient of the bullying index for the other Spanish regions

Andalusia	Aragon	Asturias	Canary Islands	Cantabria	Castile and Leon	Castile-La Mancha
0.08	-3.4	-2.3	-3.0	-0.5	0.4	-2.6
(3.5)	(3.1)	(3.1)	(2.8)	(2.8)	(3.1)	(3.7)
Community of Madrid	Extremadura	Galicia	Balearic Islands	La Rioja	Community of Madrid	Navarre
-6.1*	-5.1	-7.2***	-9.0***	-3.7	-2.7	-4.4
(3.4)	(3.4)	(2.5)	(2.9)	(3.5)	(2.2)	(3.1)

Note: The standard deviations are in parentheses. *, **, *** indicate significance at 10%, 5%, and 1%, respectively.

As previously stated, to determine the effect of bullying in all the regions, we also estimate equation (1) for the remaining regions. The results can be seen in Table VII, which shows an estimated coefficient of BEINGBULLIED for each of them. This coefficient is negative for most of the regions, although it is significant only in the three regions with co-official languages: the Valencian Community, Galicia, and the Balearic Islands. These three regions, along with Catalonia and the Basque Country, are among those with the highest rates of bullying in Spain (see Figure I). It would be advisable to explore this novel result in the academic context and for the appropriate authorities to attempt to remedy this situation.

Discussion and conclusions

The results obtained from the seventh edition of the PISA report show a negative impact of bullying on mathematics achievement for Spanish students. The analysis by Autonomous Communities shows that this negative effect occurs in regions with co-official languages (Catalonia, the Valencian Community, Galicia, the Balearic Islands, and the Basque Country) and the Region of Murcia.

This demonstrates the need to consider linguistic diversity in bullying intervention programs, along with other factors that increase students' heterogeneity. It has also been shown that bullying does not affect students equally. Students with different traits than the majority are generally more likely to become victims of bullying. Thus, in regions with two official languages, the probability of experiencing bullying increases. This is one of the important and novel contributions of this study, which should be further explored.

Álvarez-Sotomayor and Martínez-Cousinou (2020) consider linguistic disadvantage as a key factor in the lower achievement of students with immigrant parents in Spain. Although they recognize that advances have been made in knowledge about the relationship between language competence in the vehicular language (language of teaching) and achievement, they conclude that "the practical absence of studies simultaneously measuring proficiency in the language in which subjects are taught and academic achievement makes it impossible to obtain rigorous empirical knowledge about this relationship" (Álvarez-Sotomayor and Martínez-Cousinou, 2020, p. 1).

Calero and Choi (2019) and Doncel-Abad and Cabrera-Álvarez (2020) show that linguistic models may be associated with students' achievements, although they recognize that more research is needed in this area due to the scarcity of robust studies. Specifically, in the first study, the authors find that students who speak Castellano at home and Catalan at school had lower scores in PISA 2015 in science and reading, while the results in mathematics were not clear. This result could be because mathematics uses "a specific formalized language" (Calero and Choi, 2019, p. 43). However, the "language spoken at home, be it co-official or Castellano, does not affect performance in PISA," even though they have different linguistic models, according to Doncel-Abad and Cabrera-Álvarez (2020, p. 182).

After carefully analyzing the various risk factors associated with bullying, we conclude that bullying does not affect men and women in the same way and with the same intensity, with male students having a greater likelihood of being intimidated. Different patterns in the way adolescents experience bullying have also been identified. Girls tend to be victims of more indirect types of bullying, such as social exclusion and defamation, which involve psychological aggression intended to damage their social relationships and reputation.

Boys more frequently experience direct expressions of bullying, such as verbal aggression, which is more visible. These findings based on gender align with the results of previous studies (Carrera et al., 2013; López-Hernández, 2013; Ruiz-Narezo et al., 2020). Some authors also highlight that a country's cultural values can create stereotypes of gender differences, which influence bullying (Hellström and Beckman, 2020; Piñeiro et al., 2022).

Some studies suggest a relationship between economic inequality and bullying (Due et al., 2009). Children of families with low incomes have limited access to resources and emotional support, which increases their isolation and exposure to environments where bullying is more frequent. Our results show that cases of bullying more often occur among students with lower economic and social status.

Immigrant students are more exposed to bullying than native students, which is particularly important among Murcian students. When considering the language spoken at home, the Region of Murcia also shows a higher incidence of bullying among the group of students who do not speak Castellano at home. This region, with a high proportion of immigrant families, has a large number of students whose first language is not Castellano. Specifically, the Region of Murcia is among the regions with the highest proportion of students from immigrant families in Spain, at 15.5% (MEFP, 2019). However, these disparities are not as pronounced in Catalonia and the Basque Country, which could be due to the fact that in these regions, the PISA test is in the co-official language in the first case, namely, in Catalan, and Basque students can do the test in Euskera or Castellano. Thus, students who speak a different language at home are not necessarily immigrants; the language spoken at home could be Castellano.

The results also show high levels of absenteeism and grade repetition among bullied students. This indicates that students who are victims of bullying try to escape the hostile environment created by their aggressor by not attending class. Consequently, their education and social integration are adversely affected, causing them to fall behind and achieve less. This makes them more likely to repeat a grade, which is quite a drastic relationship, as Yu and Zhao (2021) state in their estimations.

Recent studies have confirmed a negative relationship between achieve-

ment and bullying. It is clear that bullying leads to increased absenteeism and less participation, which can result in lower achievement (Juvonen et al., 2011; Méndez and Cerezo, 2018; Sbroglio and Aniceto, 2021). The estimation of our econometric model confirms this negative relationship between test scores and suffering from bullying in Spain, although this result cannot be generalized for all the regions. Analyzing them separately, we find that the relationship is negative for almost all the regions, but it is only significant in six: Catalonia, the Valencian Community, Galicia, the Balearic Islands, the Basque Country, and the Region of Murcia. Excepting the last one, all of these regions have a second official language and bullying indexes above the national average. Although we do not have conclusive information about the causes of this relationship, it is worth asking why some of the “richest” regions, like Catalonia and the Basque Country, which should be more developed, are more affected by bullying than other “poorer” like Andalusia.

The Region of Murcia is a particular case because, without a high bullying index, it does show a considerable negative influence of bullying on average maths scores, which is linked to the presence of a large proportion of immigrant students, who are more likely to be victims of bullying. Therefore, since increased heterogeneity among students leads to a higher risk of bullying, it is essential to facilitate integration when there is personal, economic, linguistic, or cultural diversity in schools to guarantee a stable and safe environment for all students, regardless of their mother tongue.

Finally, according to our results, bullying is an obstacle to education, resulting in poorer performance. The relevance of implementing an effective bullying prevention plan is clear. This could foment solidarity among students, promote prosocial behavior, make students aware of the consequences of the phenomenon, and provide an action protocol. These policies should also be directed toward teachers, parents, and the educational community as a whole since it is essential to visualize this problem and raise social awareness in order to design efficient policies. There will be, without doubt, many difficulties, but it is crucial to achieve an adequately harmonious climate in schools promoting the acceptance of differences in heterogeneous societies.

This study has some limitations, among which is the fact that it only analyzes achievement in mathematics. Future research could investigate reading

and science skills. Other possible developments could involve introducing a temporal perspective or conducting a comparative study among OECD countries to analyze Spain's international position. Moreover, the analysis of cyberbullying has been omitted since its dimension and particular characteristics require a separate study.

Despite these limitations, we feel that the study offers novel and relevant results.

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From Preschool to High School: Overview of Inclusive Education

De infantil a secundaria: panorama de la educación inclusiva

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Abstract

Inclusive education is a key issue in Spain, present in current educational legislation such as the LOMLOE. This study comparatively analyses teachers' experiences in addressing diversity across early childhood, primary, and secondary education stages, with a sample of 2665 education professionals. A structured questionnaire was used, which included demographic data, knowledge questions about inclusive education, context analysis, and received teacher training. The findings indicate a significant gap between the perceived importance of inclusive education and its actual implementation. Also, although 74.1% of respondents reported having received training in inclusive education, a high percentage showed difficulties in identifying the concept of inclusion when faced with conceptual questions. Regarding educational stages, early childhood education specialists had a greater recognition of inclusive concepts compared to primary and secondary school teachers. In terms of the perception of the environment, early childhood educators and those not yet working in educational centres considered the development of inclusive education more necessary compared to primary and secondary school teachers. Finally, in terms of training, primary school teachers perceive themselves as being more trained than those in early childhood and secondary education, although all groups expressed a high need for continuous training to improve their inclusive practices. These results highlight the need to strengthen continuous teacher training pro-

grams, promoting the adaptation of resources and methodologies in classrooms to guarantee accessibility for all students. It is recommended to enhance this training through practical experiences and mentorships within school hours, led by experts in inclusive education, fostering a contextualized and personalized learning approach. However, its effectiveness also depends on structural and organizational changes within schools that facilitate the real implementation of inclusion.

Keywords: Educational inclusion; Teacher training; Inclusive practices; Diversity in education; School environment

Resumen

La educación inclusiva es un tema central en España, presente en la legislación educativa vigente como es la LOMLOE. Este estudio analiza comparativamente las experiencias docentes en la atención a la diversidad en las etapas de educación infantil, primaria y secundaria, con una muestra de 2665 profesionales en educación. Para ello, se empleó un cuestionario estructurado con datos demográficos, preguntas de conocimientos sobre educación inclusiva, análisis del contexto y formación docente recibida. Los hallazgos indican una brecha significativa entre la importancia percibida de la educación inclusiva y su implementación real. Asimismo, aunque el 74,1% de los encuestados notificaron haber recibido formación en educación inclusiva, un porcentaje elevado mostró dificultades en identificar el concepto de inclusión ante preguntas conceptuales. En cuanto a las etapas educativas, los especialistas en educación infantil reconocieron mejor los conceptos sobre inclusión en comparación con el profesorado de primaria y secundaria. Respecto a la percepción del entorno, los docentes de infantil y los que no trabajaban aún en centros educativos, consideraron más necesario el desarrollo de una educación inclusiva en comparación con los docentes de primaria y secundaria. Finalmente, en términos de formación, los docentes de primaria se perciben más formados que los de infantil y secundaria, aunque todos los grupos manifestaron una necesidad alta de formación continua para mejorar sus prácticas inclusivas. Estos resultados resaltan la necesidad de reforzar los programas de formación continua del profesorado favoreciendo la adecuación de recursos y metodologías en las aulas para asegurar la accesibilidad de todo el alumnado. Se recomienda reforzar esta formación de forma práctica con experiencias reales y mentorías dentro del horario escolar por parte de expertos en educación inclusiva potenciando una formación contextualizada y personalizada. No obstante, su efectividad también depende de cambios estructurales y organizativos en los centros que faciliten la aplicación real de la inclusión.

Palabras clave: Inclusión educativa; Formación docente; Prácticas inclusivas; Diversidad en educación; Entorno escolar

Introduction

For decades, educational inclusion has become a central topic in academic and pedagogical discussions, advocating for an education that guarantees participation, development, and learning for all students, regardless of their abilities, socioeconomic or cultural origin, or educational needs (Ainscow et al., 2006; Echeita, 2006). Its relevance and concern in empirical and research contexts have increased up to the present day in the different educational stages (Solís & Real, 2023).

The importance of inclusive education in classrooms lies in its ability to promote a fairer and a more equitable society. In line with Shaeffer (2019), inclusive education is directly connected to a social model based on values of equity, cohesion, and solidarity. To be able to build inclusive societies, we should inexorably have inclusive schools, which would be not only necessary to prevent and stop social exclusion (Echeita, 2006) but also as a prerequisite for a democratic society (Soldevila-Pérez et al., 2025). Furthermore, the UN's Sustainable Development Goal 4, "Quality Education," aligns with this approach, emphasizing the importance of promoting an inclusive education as a foundation for the sustainable development of societies (UNESCO, 2017).

Inclusive education is consolidated as an irrefutable principle internationally thanks to the Salamanca Statement (UNESCO, 1994), which underscores the need to adapt the educational systems to cater to the diversity of students and lays the groundwork for developing educational systems that view diversity as a richness rather than an obstacle.

In Spain, inclusive education is backed by the legal framework. The Royal Legislative Decree 1/2013, of November 29, which approves the consolidated text of the General Law on the rights of persons with disabilities and their social inclusion, states in Article 16 that "inclusive education will be part of the comprehensive care process for people with disabilities". Similarly, the Organic Law 3/2020, of December 29, which modifies the Organic Law 2/2006, of May 3, on Education (LOMLOE), significantly addresses inclusion and attention to diversity within the educational system. This law represents a paradigm shift that values the importance of analyzing context, barriers, and facilitators, as well as pedagogical and organizational practices

within schools to achieve true inclusion in classrooms. It also introduces the concept of Universal Design.

However, despite legal support for inclusive education, the implementation of inclusive practices faces numerous challenges in real contexts (Boyle & Allen, 2023). Therefore, there is a constant need to review and adapt initial and ongoing teacher training, as well as pedagogical practices.

Among the challenges to implement inclusive education in classrooms, Ainscow et al. (2006) identify resistance to change and lack of teacher training as significant obstacles. On the other hand, Florian and Linklater (2010) discuss how traditional pedagogical practices might limit the effective participation of all students. These difficulties highlight the importance of a profound transformation in educational policies and teacher preparation to foster a truly inclusive environment.

Several authors suggest that the debate on inclusion should focus on the barriers within the educational system when it comes to allow the presence, participation, learning, and outcomes of all students (Booth & Ainscow, 2011). Focusing on these barriers shifts the emphasis away from the personal characteristics of students and allows to concentrate on the context and social environment. Acknowledging that barriers are identifiable inherently implies the possibility of change: removing or modifying them. However, the first step would be precisely to develop the ability to detect these barriers, which, concerning teachers, requires training, as indicated by Gallego (2023) or Márquez and Moya (2024). Therefore, it is necessary to explore how teachers are trained to address the inclusion challenges at different educational stages and investigate to what extent teachers feel prepared and trained to support inclusion.

Addressing diversity involves offering a psycho-educational and social response through an inclusive and accessible pedagogical design for all. According to Pinilla-Arbex (2020), one of the advantages of this approach is that it focuses on the educational response the school is accountable to provide, rather than on the characteristics of the students. By focusing on this educational response, it is unavoidable to step back and ask what this response is determined by. To what extent does their mental representation of the situation, their perspective, determine their actions?

Booth and Ainscow (2011) point out that perspectives reveal implicit conceptions and theories about diversity, and that this representation determines what is considered, what is perceived (e.g., whether it might be perceived when a student is having some kind of difficulty), how it is interpreted (e.g., interpreting the need for specific support), and, consequently, how one acts upon it (e.g., offering support to him/her). This explanation highlights the importance of considering teachers' perceptions as a determining factor in promoting educational inclusion. Differences in teachers' conceptions about inclusion may influence practices and the creation of an inclusive educational environment (Serna & Serna, 2023).

Studies by Florian and Black-Hawkins (2011) or Forlin and Chambers (2011) have identified various attitudes and beliefs among teachers regarding inclusion, ranging from unconditional support to resistance to change. These attitudes may be linked to socio-emotional factors, training, and prior experiences (Albalá Genol et al., 2023).

Therefore, it would be necessary to consider teachers' conceptions as a determining factor in promoting educational inclusion. It is essential to analyze how teachers and future educators perceive inclusive education, identifying attitudes, beliefs, and barriers.

Based on the above, this study aims to: 1) Explore how diversity is addressed in classrooms in terms of measures and schooling types; 2) Investigate to what extent teachers feel prepared and trained to promote inclusion; 3) Analyze teachers' perceptions and attitudes towards inclusion.

Method

This study adopts a non-experimental, descriptive-comparative design aimed at analyzing teachers' perceptions regarding inclusive education, considering their understanding, implementation, and training in this area. It is a cross-sectional study, thus allowing for the examination of the teachers' current situation at a specific moment in time (Ato et al., 2013).

Sample

The study was conducted with a sample of 2,665 education professionals (graduates or diploma holders in early childhood and/or primary education, or specialists with a master's degree in teacher training), including 574 men (33.61 ± 7.9 years old) and 2,091 women (33.31 ± 7.3 years old). Regarding the educational stage in which participants work, Table I shows the frequency of cases by each stage:

TABLE I. Educational stage in which the participants work.

<i>Educational stage in which the participant works</i>	N	Percentage
Not working	1018	38.6%
Early Childhood Education	308	11.7%
Primary Education	888	33.7%
Early Childhood and Primary Education	169	6.4%
Secondary Education	179	6.8%
Primary and Secondary Education	46	1.7%
Early Childhood, Primary and Secondary Education	29	1.1%
Early Childhood and Secondary Education	1	0.03%
Does not know (DK)/No answer (NA)	27	1%
Total	2665	100%

Source: Compiled by the author

According to Freedman (2009), the sampling type was convenience sampling due to the limitations of randomly accessing the specific population profile targeted by the study and based on the availability of the participating subjects.

Instruments

For the development of the study, a customized questionnaire was managed, divided into three parts. In the first part, after presenting and accepting the informed consent to participate in the study, demographic data were collected (age, gender, place of origin, previous studies, teaching experience, and train-

ing received on inclusive education).

Subsequently, eight questions were formulated. The first two were yes/no questions aimed at assessing whether participants were able to differentiate when a measure aligns with the principles of inclusion or not. According to Oh-Young and Filler (2015) and Echeita (2006), one characteristic of inclusive education is the joint participation of all students in the same classroom. Based on this, two statements were created in order to identify whether teachers recognized such feature of inclusive education. The two statements were as follows:

- I believe that having a linked classroom for those students joining late the education system is an inclusive measure.
- The schooling of students with Special Educational Needs (SEN) in a special classroom but within regular schools is an inclusive measure.

Following the characteristics of inclusive education described by the authors, the correct answer to both questions would be “No,” since the condition of joint participation among all students is not met.

After these statements, six Likert scale questions were posed, ranging from 1 (not at all) to 5 (totally), following Boone and Boone’s guidelines (2012). These questions, as well as the previous statements, were agreed upon by two experts in inclusive education with over 10,000 hours of teaching experience each, achieving a 100% agreement on the relevance of the questions regarding inclusion. The formulation of the items was based on previous studies on inclusive education, ensuring alignment with the scientific literature:

- 1. To what degree do you feel trained in inclusive education? (Forlin, 2010; Sharma et al., 2006).
- 2. To what degree do you consider that the school environment you work in or in which you have had internships promotes inclusion? (Booth & Ainscow, 2011).
- 3. Do you consider inclusive education to be necessary? (Avramidis & Norwich, 2002; De Boer et al., 2010).
- 4. Do you consider your environment to be prepared to promote inclusive education? (Carter & Hughes, 2006; Florian & Black-Hawkins, 2011).
- 5. To what extent do you believe that the schooling of special edu-

education students should take place in regular schools? (Hornby, 2015; UNESCO, 1994).

- 6. Do you consider it necessary to carry out training sessions on inclusive education? (Forlin & Chambers, 2011; Sharma & Sokal, 2015).

Procedure

The survey was administered via an online questionnaire (Google Forms) at several Spanish universities to groups of students participating in master's degree or degree education programs between 2019 and 2022. However, the students were required to have at least one prior qualification that enabled them to practice in the education field.

Data Analysis

For the data analysis, descriptive variables (mean, standard deviation, and frequencies) of the personal data questionnaires were first analyzed. After checking the normality of the data using the Shapiro-Wilk test, to establish differences between the values obtained in different items, a T-student test (Field, 2013) was conducted for comparisons between two groups (gender), establishing a significance level of $p < 0.05$. Additionally, an ANOVA test was used to compare the results between the groups according to the educational stage they worked in. The eta squared (η^2) was also calculated to estimate the effect size and assess the magnitude of the differences found. Subsequently, the Tukey test was used in post-hoc comparisons in order to determine the specific differences between groups. The questionnaire questions were designed to evaluate different independent aspects of inclusive education, not forming a single construct. For this reason, it was deemed inappropriate to evaluate reliability using internal consistency coefficients such as Cronbach's Alpha (Celina & Campo-Arias, 2005).

With a view to avoid Type II errors and evaluate the adequacy of the sample, a power analysis (Cohen, 1988) was conducted, setting the effect size at 0.8 and the significance level at $p < 0.05$; the obtained power value was 1.0. The correlation analysis was carried out using Pearson's correlation. SPSS

24.0 was used for the statistical analyses.

Results

Table II reflects the most common situations experienced by teachers regarding addressing diversity in classrooms.

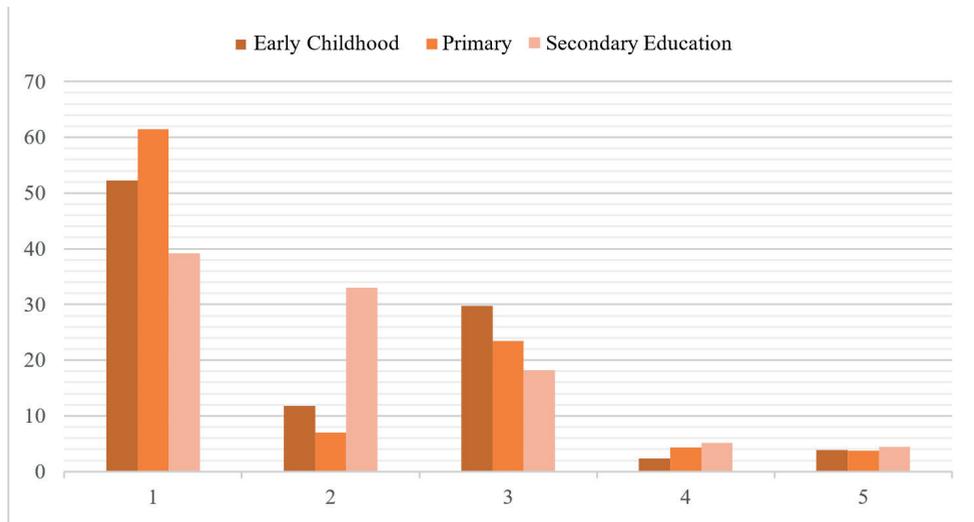
TABLE II. Most common ways of addressing diversity in classrooms.

Situation	N	Percentage
1. Students enrolled in regular classrooms but who leave occasionally for support.	1513	56.8%
2. Students with diversity participating 100% of the time in their classroom-group activities.	252	9.4%
3. Students enrolled in regular classrooms who receive support within the classroom.	519	19.4%
4. Students enrolled in special education.	146	5.5%
5. Students enrolled in regular schools but in special classrooms.	108	4.1%
Does not know (DK)/No answer (NA)	127	4.8%
Total	2665	100%

Source: Compiled by the author

Figure I shows a comparison of the percentages of the types of situations experienced based on the educational stage: early childhood, primary, and secondary. Each situation indicated by a number corresponds to the type of situation listed in table II.

FIGURE I. Most common ways of addressing diversity according to educational stage.



Source: Compiled by the autor

Regarding the training received throughout their university education, 671 (25%) respondents indicated that they did not receive specific training in inclusive education, whereas 1,986 participants (74.1%) reported having received such training. Furthermore, when presented with the following statements, where participants had to respond “yes” or “no”:

- I believe that having a linked classroom for those students joining late the education system is an inclusive measure.
- The schooling of students with SEN in a special classroom but within regular schools is an inclusive measure.

It was found that, in the first statement, 1,775 participants (66.2%) responded that the linked classroom is an inclusive measure, even though the literature on inclusive education indicates that segregation in separate classrooms does not align with a genuine inclusive model (Ainscow et al., 2006). Similarly, in the second statement, 1,070 participants (39.9%) indicated that enrollment in special classrooms within regular schools is an inclusive measure, which also deviates from the principles of full inclusion (Echeita, 2006).

Regarding the questions posed in the questionnaire, table III shows

the values obtained for each question as well as the comparison by gender.

TABLE III. Differences between women and men on considerations regarding inclusive education.

Questions	Men N = 571	Women N = 1853
1. To what degree do you feel trained in inclusive education?	2.68 ± 0.9*	2.83 ± 0.9*
2. To what degree do you consider that the school environment you work in or in which you have had internships promotes inclusion?	3.21 ± 0.9	3.05 ± 0.9
3. Do you consider inclusive education to be necessary?	4.73 ± 0.6	4.79 ± 0.5
4. Do you consider your environment to be prepared to promote inclusive education?	2.95 ± 0.9	2.9 ± 0.9
5. To what extent do you believe that the schooling of special education students should take place in regular schools?	3.91 ± 1.0	3.93 ± 0.9
6. Do you consider it necessary to carry out training sessions on inclusive education?	4.85 ± 0.4	4.91 ± 0.3

* $p < 0.05$. Compiled by the author

These data demonstrate how teachers consider both inclusive education and the need for training in this context to be highly relevant, showing very high values (close to 5.0) with a small standard deviation, indicating almost unanimous agreement. However, the data also reveal a gap between needs and reality, as the perceived extent to which inclusion is promoted in the school environment and the degree of teacher preparation are considered at medium or low levels (around 3 or below). Regarding gender, only minor significant differences were observed, except for item 1, where women felt more trained in inclusive education.

In the comparison of results by items, items 3 and 6 were significantly higher ($p < 0.05$) compared to items 1 and 2, both for men and women, confirming the gap between needs and reality.

The response to these questions was also cross-checked based on the educational stage in which the teachers worked. The ANOVA test identified significant differences between groups for questions 1, 2, 3, and 6. Table IV shows the values extracted from the ANOVA test along with the calculation of the effect size.

TABLE IV. ANOVA results according to the educational stage.

Questions	Degrees of Freedom	F	p	Partial η^2
1.	7.26	17.11	< 0.001	0.043
2.	7.26	6.47	< 0.001	0.017
3.	7.26	4.99	< 0.001	0.013
6.	6.22	2.69	< 0.05	0.007

* $p < 0.05$. Source: Compiled by the author

In the comparison of samples carried out independently, differences were found in the results of secondary school teachers compared to some of the other groups analyzed. Table V shows this comparison. Participants who worked in different educational stages were excluded from this analysis to prevent potential biases.

TABLE V. Differences in considerations regarding inclusive education between educational stages.

Questions	Does not work (NT) N = 1014	Early childhood (I) N = 308	Primary (P) N = 887	Secondary (S) N = 178	Sig.
1.	2.62 ± 0.9	2.77 ± 0.8	2.91 ± 0.9	2.74 ± 1.0	NT < I, P, S S < P
2.	2.95 ± 0.9	3.13 ± 1.0	3.2 ± 0.9	3.08 ± 1.0	NT < I, P, S
3.	4.84 ± 0.44	4.83 ± 0.4	4.71 ± 0.6	4.71 ± 0.6	NT, I > P, S
4.	2.90 ± 0.9	2.88 ± 0.9	2.95 ± 0.9	2.82 ± 1.0	P, NT > S
5.	4.0 ± 1.0	3.89 ± 1.0	3.88 ± 0.9	3.82 ± 1.1	NT, I, P > S
6.	4.9 ± 0.3	4.95 ± 0.2	4.87 ± 0.4	4.84 ± 0.4	P < NT, S < I

* $p < 0.05$. Source: Compiled by the author

These results reinforce the gap between the importance that teachers give to inclusive education and what they actually observe. Among the different analyses, aspects to be highlighted include that teachers not working in schools feel less qualified to develop inclusive strategies than working teachers, regardless of the stage. Similarly, teachers who are not working perceive

their internship environments as less inclusive than teachers who work in their own schools. It is also observed that primary and secondary teachers consider inclusive education slightly less important than early childhood teachers or those not working. However, the values obtained in any of the cases are very high, and the difference between groups is small.

In item 5, it is noted that as teachers progress through the stages, there is a decreasing trend in considering that students schooled at special education centers should be enrolled in regular classrooms. Lastly, table VI shows the correlation between the responses to the questions.

TABLE VI. Significant correlations ($p < 0.05$) between responses to questions.

Questions	1	2	3	4	5	6
Age			- 0.11			-0.1
1. To what degree do you feel trained in inclusive education?		0.32	0.08	0.23		
2. To what degree do you consider that the school environment you work in or in which you have had internships promotes inclusion?	0.32			0.47		-0.1
3. Do you consider inclusive education to be necessary?	0.08			0.13	0.32	0.31
4. Do you consider your environment to be prepared to promote inclusive education?	0.23	0.47	0.13		0.08	
5. To what extent do you believe that the schooling of special education students should take place in regular schools?			0.32	0.08		0.19
6. Do you consider it necessary to carry out training sessions on inclusive education?		-0.1	0.31		0.19	

Source: Compiled by the author.

The correlations presented between items 2 and 4, as well as between items 3 and 6, and between 3 and 5, are as expected given the content of the questions, therefore providing validity and consistency to the study (Reynolds et al., 2021). Notably, there is a positive and significant correlation between how teachers perceive their training and the extent to which they believe their environment promotes inclusion (items 2 and 4). Concerning

the age variable, the correlation between different items was explored, and a significant ($p < 0.05$) and inverse correlation was found between the age and the perception of the need for inclusive education ($Rho = -0.111$), as well as with training in inclusive education ($Rho = -0.1$). However, the size of the correlation was small.

Discussion

The results obtained reveal a particular preference in Spain for enrolling all students in regular schools. Only 5.4% of the sample indicated that the most common schooling situation for addressing diversity that they observed in classrooms was in special education classrooms, aligning with the study of Sandoval et al. (2022). A report from the Spanish Government (MEFP, 2021) for the 2020-2021 academic year indicated that 9.3% of students in compulsory education presented specific educational support needs (ACNE-AE), and out of these, 2.8% of the total student population had SEN. In this same report, 82.9% were enrolled in regular education. These data reflect the interest of the authorities in facilitating the attention to diversity through regular classrooms, an aspect promoted by the Salamanca Statement (UNESCO, 1994), as well as by the current law, the LOE-LOMLOE. However, as Graham et al. (2020) indicate, enrolling students in regular classrooms does not guarantee the provision of an inclusive educational attention. Thus, an important question to explore is: how are students with SEN attended within regular classrooms?

In classrooms, the most common measure for addressing different learning needs is to provide support and reinforcement for students outside the classroom (56.4%), followed by offering support within the classroom (19.4%). However, only 9.4% of the sample indicated that, in their context, diversity is addressed 100% of the time through activities developed for the whole classroom-group. In the study by Pascual et al. (2019), early childhood teachers reported that the most frequently used measures were support in regular groups (24.6%), specialized support (17.9%), and support outside regular

groups (17.7%). According to these authors, in primary education, the most common measure was also to provide support in regular groups (23.1%), followed by support outside regular groups (22.2%) and specialized support (20.2%). The percentages of students receiving support within the regular classroom in this study are similar to those reported by Pascual et al. (2019). However, there is a large difference in the results regarding the percentage of students receiving support and reinforcement outside the classroom. In our study, both in early childhood and primary education, this was the most common measure observed by teachers. In primary education, there is also an increase in the provision of support outside the classroom compared to early childhood (Early Childhood = 52.3%; Primary = 61.5%), which is also noted in the study by Pascual et al. (2019). As Sánchez et al. (2017) suggest, primary education seems to have a less inclusive vision than early childhood education.

A notable finding is that as students progress through educational stages, there is an increase in the number of students enrolled in special education classrooms (2.3% in early childhood, 4.3% in primary, and 5.1% in secondary). However, in secondary education, there is a significant reduction in the number of students leaving the classroom to receive support, a decrease in the support provided within the classroom, and a noticeable increase in the attention of the students with diversity participating 100% of the time in their classroom-group activities. This shift may be justified by the flow of students with SEN to special education schools or different curricular diversification programs, as presented by Martínez-Pastor (2024). It is also worth mentioning Navarro's (2015) study, where teachers indicated that there was a higher need for teachers with inclusive education training in early childhood and primary education (25%) compared to secondary education (12.5%). Similarly, Navarro (2015) also found that more early childhood and primary school teachers (37.5%) considered that schools were not prepared to provide an inclusive response compared to secondary teachers (25%). These findings may be linked to lower diversity in secondary classrooms due to curricular diversification situation, as previously mentioned. In contrast, studies like the one of Pascale et al. (2019) suggest that secondary education is one of the stages that needs more training and where teachers feel less prepared (Márquez & Moya,

2024). This may be due to the greater complexity of the curriculum and to an increased need for specialization in subjects.

The data from this study also indicate that, despite both the regulatory framework and interest in achieving the normalization of diversity in classrooms, there is still a perception of a more integrative rather than inclusive model in the classrooms. This model is more based on the use of support and reinforcement measures than on the use of strategies that address diversity through the general classroom dynamics, such as through Universal Design for Learning (DUA; Alba, 2018). However, as Schreffler et al. (2019) indicate, the impact of using UDL in the classroom is still under development, and the empirical literature on this is still limited. It must be mentioned that among the studies analyzed regarding the measures used to address diversity in the classroom, as far as authors know, none of them explicitly included UDL as a measure to address diversity, making it difficult to gain insight into UDL's role in today's schools. Although UDL was not explicitly mentioned in the present study, one of its principles—including attention to diversity from within the classroom-group without support measures that separate students—was included among the items. Only 9.4% reported that this was the predominant type of attention observed in their context. While being a low percentage, it could reflect positively teachers' growing interest in gradually implementing such actions to address diversity in the classroom.

However, while the data from the study provide insight into how diversity is perceived to be addressed in Spanish classrooms, it is important to note that these data are based on teachers' perceptions rather than direct observations, which could be a limitation of the study (Cohen et al., 2018).

Regarding the training received, despite the regulatory framework promoting inclusion, it is surprising to find that a high percentage of respondents (25%) consider they did not receive specific training in inclusive education during their studies, as well as the high percentage of respondents who did not correctly answer the conceptual questions (66.2% in question 1 and 39.9% in question 2). These results highlight a discrepancy between the reported training and the proper assimilation of the concept of inclusion, identifying as inclusive measures that, according to scientific literature, correspond rather to an integrative model (Ainscow et al., 2006). This divergence

could be explained by the variability in the training received and the depth with which the principles of inclusive education are addressed in curricula.

Regarding perceptions on training, teachers who were not currently working considered themselves slightly less trained than active teachers. Following Martín-Ondarza et al.'s (2022) study, the Contact Theory could partially explain these differences, as this theory suggests that direct interaction with diversity can reduce prejudice and increase knowledge about inclusion. However, for this to occur, teachers with experience should have had positive inclusion experiences to strengthen this theory, which was not evaluated in the present study. On the contrary, teachers who were not working, as well as those in early childhood education, considered inclusive education to be slightly more important than teachers in primary and secondary education. This could be due to the fact that early childhood education often involves universal enrollment, including students with SEN, as well as to a greater heterogeneity among students as a result of the different developmental stages and birth dates; differences that tend to reduce as students advance through educational stages. Additionally, early childhood teachers were the ones that most emphasized the importance of training in inclusive education. According to Segura-Pérez et al. (2024), this greater concern may indicate higher levels of training.

The lack of training in inclusive education is highlighted by authors such as González-Gil et al. (2016) or Rodríguez (2019) in various educational contexts and geographical locations. In line with the aforementioned results, Llorent and López-Azuaga (2012) indicated that a low level of training in inclusive education motivated the preference for integrative models, raising the importance of continuing to promote basic inclusive education training in university degrees, as well as in continuous teacher training (Durán & Giné, 2012). These facts could justify why surveyed teachers observe more integrative measures than inclusive ones in their classrooms. However, it is also important to highlight that the regulatory framework for verifying official university degrees that qualify teachers to work in early childhood education, primary education, or secondary education (regulated by the Orders ECI/3854/2007, ECI/3857/2007, and ECI/3858/2007) does not specifically refer to inclusive education content. Only in the “Educational Guidance” spe-

cialty “inclusive education and diversity management” is listed as a specific subject. This fact could explain why teachers do not consider themselves adequately trained in inclusive education (item 1) nor believe that their environment is prepared nor is implementing inclusive practices (items 4 and 2).

On a positive note, through items 3 and 6, teachers expressed a high sensitivity to the need of developing an inclusive school and the importance of teacher training. This positive attitude was also reported by authors such as Solís and Real (2023) in the context of secondary education or Hernández-Amorós et al. (2017) in the context of primary school teachers. This gap between training needs and attitudes towards inclusion could explain the heterogeneity of results obtained in item 5. Although most teachers considered that students enrolled in special education should be enrolled in regular schools, the response was not unanimous nor as high as in other items (items 3 and 6). Among the different educational levels, secondary teachers were the least likely to consider that special education students should be enrolled in regular schools. This may be due to the organizational and curricular structure of the stage, as well as the training and attitudes of the teachers (Albalá Genol et al., 2023; Solís & Real, 2023). However, the debate about which school model to adopt is extensive in the literature, and it considers not only the educational model but also the current reality of classrooms in terms of resources, teacher training, and the presence of real barriers or facilitators (Parra, 2011).

When analyzing correlations between different variables, even though there was some sort of negative correlation between the age and the extent to what teachers considered themselves to be trained in inclusion or the degree to which they considered training in educational inclusion to be necessary, this correlation was very small, not being possible to generalize by saying that those variables depend on the age (Cohen, 2013).

Existing correlation between items 4 and 2, as well as between items 3 and 6, and 3 and 5, provide internal consistency to the items of the questionnaire and strengthen its reliability, being items for which such correlation could be expected (Reynolds et al., 2021).

Similarly, it is worth mentioning the positive relationship found between the degree to which the teacher feels sufficiently trained in inclusive education and the degree to which he/she considers that his/her working en-

vironment promotes the inclusion or the degree to which the environment is ready for favoring inclusive education. In line with the study of Fernández-Batanero (2013), or the one carried out by Reina et al. (2016) in the field of Physical Education, the self-efficacy of teachers and their skill development are very important so that teachers promote inclusion in the classroom. In this sense, feeling trained and with enough readiness may be a key element to consider that the environment is ready for the inclusion. This correlation reveals the importance of the didactic competence as a facilitator in the learning process and in developing inclusive contexts. Beyond existing barriers and available resources in the environment, considered to be very relevant, the teachers' knowledge of strategies to promote inclusion is considered to be, by different authors, as one of the most important facilitators towards the inclusion (Reyes-Parra et al., 2020; Hurtado et al., 2019; Ricoy, 2018). However, as pointed out by Valdés (2022), the leadership towards the inclusion is not a matter that falls solely on the teacher, but rather on the inclusion culture of the schools and their educational project of the center.

Conclusion

Through this study, it has been tried to provide a comprehensive and updated view of the most frequent ways to address diversity in classrooms, the extent to which teachers feel trained in inclusive education, and their perceptions and attitudes toward inclusion.

Among the strengths of the study, to be highlighted are the broad sample and the diversity of educational stages represented, providing a comprehensive view of the state of inclusive education in Spain. Additionally, the use of a detailed questionnaire, based on concerns raised in the literature, allowed to capture important nuances in teachers' perceptions regarding the reality of inclusive education in classrooms, highlighting both advances and areas in need of improvement.

As limitations of the study, the reliance on self-reported data could

introduce biases in the responses. The lack of direct observations in classrooms limits the empirical verification of the practices described by participants. Additionally, although the sample was large, it does not guarantee an equitable representation of all autonomous communities, which could limit the generalizability of the results across the entire national territory. On the other hand, even though the design of the questionnaire aimed to be accessible and concise in order to avoid participant fatigue, further development of each item evaluated by means of subscales could provide greater depth to the results and strengthen the psychometric properties of the questionnaire.

As a proposal for future studies, it would be recommended to incorporate direct classroom observations to assess how diversity is addressed in real contexts. Likewise, it is also important to continue investigating the effectiveness of teacher training programs in inclusive education, both initial and ongoing, as well as their real impact on daily educational practices. Also, it is recommended to carry out longitudinal studies that analyze the evolution of teachers' attitudes and competencies in regards to inclusion over time. Moreover, the implementation and evaluation of specific pedagogical strategies, such as the Universal Design for Learning (UDL), could offer valuable findings into how to improve effective inclusion in classrooms.

From a practical standpoint, it is recommended to continue strengthening and promoting teacher training programs in inclusive education in a practical way and in contact with real situations. In some cases, training does not always need to be outside school hours; it can take place through mentorships and guidance by experts in inclusive education, helping teachers to adopt measures that increasingly promote inclusion. However, such training must be accompanied by organizational changes within schools that facilitate the application of these measures in the classroom.

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Determinants in the choice of non-compulsory science subjects

Determinantes en la elección de materias optativas de ciencias

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Abstract

Introduction: The curricular structure provides the option to forego scientific subjects in the final year of compulsory secondary education. This decision can prematurely disrupt formal engagement with these disciplines, typically around the ages of 14-15. Therefore, it is crucial to identify attitudinal factors that influence the selection of elective science subjects at an early age. This research focuses on two key constructs: the perception of difficulty and the associated costs of studying sciences and mathematics. **Methodology:** The sample comprised 214 students from 4th to 6th grade of primary education. A non-probability convenience sampling method was used to select the participants. A Likert-type instrument was administered, and its validity and reliability were assessed, proving adequate for the current sample. Data were analyzed using inferential statistics and a hierarchical logistic regression model. **Results:** A high percentage of students, ranging from 60.2% to 79.7%, exhibited a low interest in choosing elective science subjects during secondary education. The primary reason for this lack of interest is the perceived difficulty associated with these disciplines. Unexpectedly, the perceived cost of studying sciences increases students' intentions, which can be explained by various theories, such as expectancy-value theory, growth mindset theory, or self-determination theory. In contrast, neither the perceived cost nor difficulty of mathematics influences students' intentions to pursue this field. **Conclusions:** These findings are discouraging and highlight the urgency of designing and implementing educational programs targeted at the primary education stage to address

and reverse this trend.

Keywords: student attitude, learning difficulties, natural sciences, mathematics, elementary school, choice of studies, science education, science education

Resumen

Introducción: La estructura curricular ofrece la opción de no cursar materias científicas en el último curso de la educación secundaria obligatoria. Esta decisión puede interrumpir prematuramente, alrededor de los 14-15 años, el contacto formal con estas disciplinas. Por tanto, resulta fundamental identificar a temprana edad los factores actitudinales que influyen en la elección de asignaturas optativas de ciencias. La presente investigación se enfoca en dos constructos clave: la percepción de dificultad y el coste asociado a las ciencias y a las matemáticas. **Metodología:** La muestra estuvo conformada por 214 estudiantes de 4º a 6º curso de educación primaria. Se utilizó un muestreo no probabilístico por conveniencia para seleccionar a los participantes. Se aplicó un instrumento de tipo Likert, cuya validez y confiabilidad fueron evaluadas y resultaron adecuadas para la muestra actual. Los datos fueron analizados mediante estadística inferencial y un modelo de regresión logística jerárquica. **Resultados:** Un alto porcentaje de los estudiantes encuestados, que oscila entre el 60.2% y el 79.7% en función del curso escolar, muestra un bajo interés por elegir asignaturas de ciencias optativas durante la secundaria. La principal razón para esta baja intención es la percepción de dificultad asociada a estas disciplinas. De manera inesperada, el coste percibido de estudiar ciencias actúa como un factor que incrementa las intenciones de los estudiantes, lo cual puede explicarse a través de diversas teorías, como la teoría de la expectativa-valor, la mentalidad de crecimiento o la teoría de la autodeterminación. En contraste, ni el coste ni la dificultad percibidos de las matemáticas influyen en las intenciones de los estudiantes de cursar esta área. **Conclusiones:** Estos hallazgos resultan desalentadores y ponen de manifiesto la urgencia de diseñar e implementar programas educativos focalizados en la etapa de educación primaria para abordar y revertir esta situación.

Palabras clave: actitud del alumno, dificultad de aprendizaje, ciencias de la naturaleza, matemáticas, escuela primaria, elección de estudios, educación científica

Introduction

Student interest and participation in science decline as they progress through their studies (Toma & Lederman, 2022; Tytler & Ferguson, 2023). This global and persistent trend often leads to students abandoning science after completing their compulsory secondary education. In Spain, the situation is worsened by the curriculum structure. The option to avoid science subjects in the final year of secondary education results in an early end to formal en-

agement with these disciplines, typically around the ages of 14-15 (Toma, 2022a). This is concerning, given the importance of scientific literacy for active citizenship (Bybee & McCrae, 2011). Attitudes toward science significantly impact academic performance, career choices, future studies, and public support for scientific research funding (Besley, 2018; Bidegain & Lukas Mujika, 2020; Newell et al., 2015). Consequently, they have become a central focus of educational research. These attitudes reflect students' subjective evaluations of science and its study, encompassing both affective aspects (emotions and feelings) and cognitive elements (thoughts and beliefs) that shape their behavior and decisions to pursue science-related studies (Tytler & Ferguson, 2023). Despite a growing body of research, most studies focus on secondary education. However, by this stage, students' attitudes toward science are often already deteriorating, making it difficult to reverse the trend (Carrasquilla et al., 2022; Dapía et al., 2019; Robles et al., 2015). Disinterest in science is evident from primary education onward, with notable gender differences favoring boys (Dapía et al., 2019; Toma, 2022a). Therefore, identifying the attitudinal factors that influence the scientific aspirations of primary school students is crucial (Miller, 2021). This study addresses this objective, focusing particularly on two key factors: perceived cost and difficulty. The research aims to answer the following questions:

- What is the perception of difficulty and cost of learning science and mathematics among primary school students in 4th to 6th grade? What are their intentions regarding the choice of elective scientific subjects in secondary school?
- How do the perceptions of difficulty and cost of learning science and mathematics influence primary school students' intentions to choose elective scientific subjects in secondary school?

Theoretical underpinnings and operationalization of hypotheses

Cost represents the subjective assessment of the sacrifices associated with an activity (Eccles & Wigfield, 2023; Muenks et al., 2023). In the context of this study, the cost of studying science may involve, among other things, considerable mental effort or the forfeiting of other valued activities. This construct, initially proposed by the Expectancy-Value Theory, has been revitalized in recent research (Barron & Hulleman, 2015; Flake et al., 2015). These studies have refined and expanded its conceptualization and evaluation, demonstrating its relevance in the educational field. Research indicates

that high levels of perceived cost are associated with a lower valuation of the activity being studied, as well as reduced persistence and intentions to continue with it (Eccles & Wigfield, 2023; Jiang & Rosenzweig, 2021). In the case of science, this phenomenon could help explain the lack of interest and eventual abandonment of scientific studies once they are no longer mandatory, as outlined in Hypothesis #1.

On the other hand, perceived difficulty reflects the subjective assessment of the complexity of an activity, such as studying science (Pattal et al., 2018; Toma, 2022b). According to the Self-Determination Theory (Ryan & Deci, 2000), an optimal challenge promotes a sense of competence. Activities that are either too easy or too difficult can lead to boredom, discouragement, and abandonment. A high perceived difficulty reduces student interest, negatively influencing career choices and academic achievements (Ong et al., 2022; Pattal et al., 2018). In this sense, many students, despite their initial interest, abandon scientific careers due to the high perceived difficulty of studying those (Chi et al., 2017). Therefore, perceiving the learning of science in primary education as excessively difficult may lead to frustration and disengagement in later stages, as proposed in Hypothesis #2.

Finally, it is crucial to also consider the perceived cost and difficulty of mathematics when analyzing students' intentions to study science. Although mathematics is mandatory in secondary education, previous research suggests that its perceived cost and difficulty influence the choice to pursue scientific studies, particularly among women (Ellis et al., 2016; Wang & Degol, 2013). Therefore, it is likely that a high perceived cost, as outlined in Hypothesis #3, and a high perceived difficulty, as proposed in Hypothesis #4, of studying mathematics will also negatively impact students' intentions to choose elective scientific subjects in secondary education.

Method

This is a quantitative research study. The design is cross-sectional, predictive, and observational, as it aims to predict the attitudinal factors that influence the intention to choose elective scientific subjects in secondary education.

Participants

A non-probabilistic convenience sampling method was used, selecting two schools from the city of Burgos—one public and one private. The final sample consisted of 214 Spanish primary school students enrolled in 4th (22%), 5th (36.9%), and 6th grade (41.1%). Nearly half of the participants were girls (48.6%), and the average age was 10.34 years ($SD = .91$). The minimum sample size was calculated based on Ogundimu et al.'s (2016) criteria, which recommend a minimum of 10-20 events or responses per independent or predictor variable. Given a logistic regression model with six variables (as described in the following sections), a minimum of 60-120 events was estimated. The final sample size (214 subjects) provided an event rate per variable of 35.7, which far exceeded the recommended minimum.

Instruments

Data were collected using five scales based on existing instruments with evidence of validity and reliability, utilizing a 5-point Likert scale (1 = Strongly Disagree, 5 = Strongly Agree). One of these scales measures the intention to choose elective science subjects, while the other two assess perceived difficulty—one applied to science and the other to mathematics. The two difficulty scales were replicated: first applied to science, then to mathematics, resulting in a total of five distinct scales. Anonymized data are available at the following link:

https://osf.io/buzhv/?view_only=d8ecaef1997c448d951cd1abe1162fc2.

Dependent variable

A single-item scale developed by Toma et al. (2019) was used to measure students' intention to choose elective science subjects in secondary education. The specific question was: "It is very likely that I will enroll in elective science subjects in Secondary Education." Previous research has demonstrated that this is a valid and reliable measure for assessing this intention, showing high consistency in responses over time. It is important to note that in the Spanish education system, formal science education begins in Primary Education. In Secondary Education (ESO), a turning point occurs: Biology and Geology are mandatory in the first and third years, Physics and Chemistry in the second and third years, and in the fourth year, both subjects become elec-

tive. Therefore, the item explicitly refers to the Secondary Education stage.

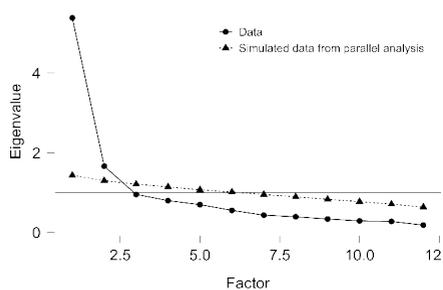
Independent variables

To measure the perceived cost of science and mathematics, a six-item scale for each subject was used. To measure the difficulty perceived by students in these subjects, a six-item scale for each subject was also employed (Pattal et al., 2018; Toma, 2022b). The validity and reliability of the instruments were tested for this specific sample. Both scales underwent exploratory factor analysis according to the recommendations of Ferrando et al. (2022). Specifically, (i) a polychoric correlation matrix was used, and factors were extracted using the maximum likelihood method with Oblimin oblique rotation; (ii) the parallel analysis criterion was employed to determine the optimal number of factors; and (iii) only those items with factor loadings above 0.40 and no cross-loadings between factors were retained.

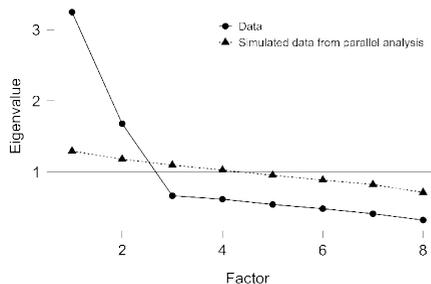
Optimal sample adequacy indices were obtained: the KMO was 0.851 for the science items and 0.867 for the mathematics items, and Bartlett's test of sphericity was significant in both cases ($p < 0.001$). The parallel analysis confirmed the presence of the two proposed latent factors (Figure I). For the science-related questionnaire, the items grouped as expected, forming two factors that explained 50.4% of the variability in the science-related responses (Table I). However, for the mathematics-related questionnaire, items 4, 5, and 6 of cost loaded onto the perceived difficulty dimension, and item 5 of perceived difficulty loaded below the minimum threshold. After their removal, the two expected factors were obtained, explaining 49.6% of the variability in the mathematics responses. The factor analysis results revealed factor loadings above 0.40 for all items, indicating high factor saturation and a clear factor structure. No significant cross-loadings between factors were observed, confirming the unidimensionality of each construct.

FIGURE I. Results of the parallel analysis

a) Science-related items



b) Math-related items



Source: Compiled by the authors

TABLE I. Results of the exploratory factor analysis

Ítems and constructs	Science		Mathematics	
	I	II	I	II
I. Cost				
1. I must sacrifice a lot of my free time to be good at science/mathematics	0.724	-0.179	0.747	-0.154
2. I must give up many things to get good grades in science/mathematics	0.756	-0.026	0.562	0.156
3. I need to spend a lot of time studying to get good grades in science/mathematics	0.722	-0.112	0.832	0.079
4. I can not spend the needed studying time to get good grades in science/mathematics	0.630	0.041	-	-
5. Science/mathematics requires too much effort from me	0.728	0.230	-	-

6. Doing science/mathematics homework takes too much of my time	0.712	0.176	-	-
II. Perceived difficulty				
1. I am not good at science/mathematics	-0.079	0.737	-0.036	0.667
2. I struggle with science/mathematics	0.150	0.645	0.019	0.684
3. I get bad grades in science/mathematics	-0.039	0.703	-0.039	0.709
4. Science/mathematics seems difficult to me	0.318	0.469	0.195	0.624
5. I find it hard to understand science/mathematics lessons	0.048	0.560	-	-
6. I cannot do the science/mathematics homework well	0.056	0.633	0.195	0.667

Source: Compiled by the authors

The reliability of the scales was evaluated using McDonald’s Omega coefficient, as it is more appropriate than Cronbach’s Alpha for ordinal-type items (Hayes & Coutts, 2020). The results indicated adequate reliability for both the cost scales (science = 0.83, mathematics = 0.74) and the perceived difficulty scales (science = 0.78, mathematics = 0.74). In summary, the instruments used were valid and reliable for the present sample, allowing for the collection of accurate information regarding students’ perceptions of these subjects.

Control variables

The gender and age of the students were used as control variables.

Data analysis

A descriptive analysis was used to examine the perceived difficulty and cost associated with science and mathematics. The Kolmogorov-Smirnov test was statistically significant for all independent variables, indicating that the normality assumption required for parametric inferential tests was not met. Therefore, non-parametric tests such as the Mann-Whitney *U* test and the Kruskal-Wallis *H* test were used for comparisons based on gender and school year, respectively. The effect size was assessed using Cohen’s *r*, with values of 0.1 indicating a small effect, 0.3 a moderate effect, and 0.5 a large effect. Additionally, a frequency analysis was conducted to identify the intentions to choose elective science subjects in secondary education. The dependent variable, being a single-item scale, was dichotomized using the

median split procedure (Iacobucci et al., 2015). Values below the median indicated low intentions and values of and above the median indicated high intentions. Comparisons based on gender and school year were made using the chi-square test, and the effect size was measured using Cramér's V , with values of 0.1 indicating a small effect, 0.3 a moderate effect, and 0.5 a large effect. Finally, a hierarchical logistic regression model was used to predict the intention to enroll in non-mandatory science courses. The correlation between the independent variables ranged from 0.202 to 0.697, meeting the multicollinearity criterion. IBM SPSS Statistics version 26 (NY: IBM Corp.) was used for the data analysis.

Results

Descriptive analysis

Table II presents the perceived cost and difficulty of science and mathematics according to sociodemographic variables. Overall, students perceive both science and mathematics as relatively low in cost and difficulty. The cost associated with mathematics is higher than that of science, and in terms of difficulty, science is seen as slightly easier than mathematics. When breaking down the results by gender, boys perceive a higher cost in studying science ($U = 4567$, $p = 0.01$) compared to girls, but no such difference is found in mathematics ($p > 0.05$). It is worth noting that the effect size was small ($r = 0.17$). Additionally, both genders perceive similar levels of difficulty in both subjects ($p > 0.05$). Finally, when considering the school year, the cost of science and mathematics decreases as students progress through the grades, but this change is not significant ($p > 0.05$). On the other hand, the perception of difficulty for both subjects remains relatively constant ($p > 0.05$).

TABLE II. Cost and perceived difficulty of science and mathematics

Sociodemographic variables	Cost of science	Cost of mathematics	Difficulty of science	Difficulty of mathematics
All participants	2.27 (0.84)	2.59 (0.96)	2.06 (0.68)	2.15 (0.73)
Boys	2.40 (0.82)	2.68 (0.97)	2.04 (0.64)	2.15 (0.76)
Girls	2.13 (0.85)	2.50 (0.96)	2.08 (0.72)	2.14 (0.69)
4th grade	2.44 (0.74)	2.79 (0.93)	2.10 (0.70)	2.19 (0.80)
5th grade	2.19 (0.87)	2.53 (0.99)	2.03 (0.66)	2.17 (0.70)
7th grade	2.25 (0.86)	2.54 (0.96)	2.07 (0.69)	2.10 (0.71)

Mean (standard deviation)

Source: Compiled by the authors

Table III presents the intentions to choose elective science subjects in secondary education according to sociodemographic variables. The majority of students show low intentions to choose elective science subjects in secondary education. When analyzing the results by gender, both boys and girls display similar patterns in terms of low intentions ($p > 0.05$). However, the distribution of intentions varies considerably according to the school year ($p = 0.023$), albeit with a small effect size (Cramér's $V = 0.19$). A significant decrease in intentions is observed in 5th grade, followed by a recovery in 6th grade.

TABLE III. Intentions to choose science electives in secondary school.

Sociodemographic variables	Low intentions	High intentions
All participants	68.7%	31.3%
Boys	68.2%	31.8%
Girls	69.2%	30.8%
4th grade	66%	34%
5th grade	79.7%	20.3%
7th grade	60.2%	39.8%

Source: Compiled by the authors

Hierarchical logistic regression analysis

Table IV presents the results of the hierarchical logistic regression model. The initial model, which included only the control variables (gender and age), did not show a significant fit to the data (χ^2 (2, N = 214) = 1.362, p = 0.506). As a result, gender and age do not influence students' decisions to enroll in elective science subjects in secondary school. The expanded hierarchical logistic regression model, which included the independent variables, showed a significant fit to the data (χ^2 (6, N = 214) = 14.233, p = 0.007), explaining between 7% and 9.9% of the variance in students' intentions to enroll in elective sciences. Of the independent variables analyzed, only the perceived cost and difficulty of science emerged as significant predictors. Specifically, the results indicate a negative relationship between the perceived difficulty of science and the intention to enroll. The odds ratio ($\text{Exp}(B)$ = 0.363) reveals that a one-unit increase in perceived difficulty decreases the likelihood of choosing elective science subjects by 63.7%. Contrary to expectations, a positive relationship was found between the perceived cost of studying science and the intention to enroll. The odds ratio ($\text{Exp}(B)$ = 1.695) suggests that a one-unit increase in the perceived cost increases the likelihood of selecting these subjects by 69.5%. Consequently, hypothesis #2 is accepted, while hypotheses #1, #3, and #4 are rejected.

TABLE IV. Hierarchical logistic regression análisis

Predictors	Step 1		Step 2	
	B	Exp(B)	B	Exp(B)
Gender	0.047	1.048	-0.094	0.910
Age	0.187	1.206	0.248	1.282
Cost of science	-	-	0.528*	1.695
Coste of mathematics	-	-	-0.222	0.801
Difficulty of science	-	-	-1.013**	0.363
Difficulty of mathematics	-	-	-0.008	0.992

* p < 0.05, ** p < 0.01

Source: Compiled by the authors

Discussion

This study examined the relationship between perceived cost, difficulties in science and mathematics, and the intention to take elective science subjects in secondary school among primary school students. This research contributes to the existing literature by analyzing a crucial stage in the development of scientific attitudes (Dapía et al., 2019; Miller, 2021).

The results indicate that students perceive mathematics as slightly more demanding than science, both in terms of cost and difficulty. Boys report higher costs in both science and mathematics, although the perception of difficulty is similar across genders. As they progress through primary school, the perceived cost in both areas decreases, but the perception of difficulty remains low and consistent. However, a high percentage of students, especially in 5th grade, show little intention to take elective science subjects in secondary school. This trend reveals an early decline in scientific attitudes and aspirations, which aligns with both international and national research (Toma, 2020; Tytler & Ferguson, 2023). Nevertheless, the results differ by gender. Previous studies suggest more positive attitudes toward science among boys than girls (Carrasquilla et al., 2022; Dapía et al., 2019). However, this study presents a contrary finding: boys reported higher levels of perceived cost in both areas. This discrepancy could be attributed to the different conceptualizations and instruments used to measure attitudes toward science. The term “attitude” serves as an umbrella for a wide range of constructs, such as self-efficacy, enjoyment, perceived relevance, and interest (Toma & Lederman, 2022). However, the cost aspect has been less explored (Flake et al., 2015), which may explain the differences found in contrast to previous studies.

On the other hand, the regression analysis indicates that the perception of cost and difficulty in science influences the intention to take elective science subjects in secondary school. However, these same factors in mathematics do not show a significant impact. This difference could be attributed to the characteristics of both subjects in primary school. Science is typically approached with a more conceptual focus, while mathematics centers on basic numerical and geometric skills. Additionally, the lesser presence of advanced mathematics in primary school science could reduce the association between the two areas as perceived by students. Future studies in secondary school, where the connection between science and mathematics is more evident, could further explore this relationship.

An unexpected finding was the positive effect of the perceived cost of

science on students' intentions. Specifically, the perceived cost significantly increased the intention to enroll in elective science subjects. Several explanations could support these results. According to the Expectancy-Value Model (Eccles & Wigfield, 2023), academic decisions are influenced by expectations of success and the value attributed to an activity. If a student perceives a high value in studying science (such as success or satisfaction), their intention to enroll will increase, even in the face of high costs. Additionally, students with a growth mindset may interpret the perceived cost of science as an opportunity to develop their skills (Dweck, 2006). This mindset, characterized by the belief in the malleability of abilities, is associated with greater persistence and a lower likelihood of avoiding tasks that require effort (Mrazek et al., 2018). As a result, these students may be more willing to choose science subjects despite the perceived costs.

Finally, these results could also be explained in light of Self-Determination Theory (Ryan & Deci, 2000). This theory distinguishes between intrinsic and extrinsic motivation. If a student is intrinsically motivated by science, the perceived cost may be viewed as an overcomeable obstacle, even a satisfying one, as it is part of an activity they find rewarding. Additionally, overcoming challenges can enhance the sense of competence, a central element in this theory. A greater sense of competence, in turn, strengthens intrinsic motivation and increases intentions. In this regard, students who perceive their studies as an investment in their professional future and who strive to meet their academic obligations are more likely to complete their studies (Abiétar López et al., 2023). However, the proposed explanations are hypothetical and require further research for confirmation.

These findings have important educational implications. At the educational level, it is crucial to intervene early, in primary education, to foster positive attitudes toward science. Given the low intention of many students to take elective science subjects in secondary school, primarily due to their perception of difficulty, pedagogical strategies should be implemented to reduce this perception, enabling meaningful learning. In this regard, it is essential to design teaching materials and activities that align with students' capabilities. Although there are resources—both analog and digital—backed by research in science education (Yáñez-Pérez et al., 2024a), their use in classrooms in Spain is limited. Therefore, the results also highlight the need for more effective educational policies (Yáñez-Pérez et al., 2024b). It is suggested that initial and ongoing teacher training be improved to provide educators with the necessary pedagogical tools to foster positive attitudes toward science

from an early age. The growth mindset theory (Dweck, 2006) can guide these efforts by teaching that scientific understanding and ability are not innate, but rather developed through practice and effort. Additionally, cognitive load theory is essential for planning effective learning, and avoiding the overload of working memory with overly complex or trivial tasks (Sweller, 2020).

The results of this study should be interpreted in light of the following limitations. Convenience sampling limits the generalizability of the findings to other populations and educational contexts. Additionally, while the instruments used have demonstrated validity and reliability, measuring cost as a unidimensional construct could be a limitation. Recent research with secondary and tertiary students indicates that cost is a multidimensional construct. In fact, the interaction between cost and the intention to enroll in science suggests the need for more comprehensive instruments that reflect the complex conceptualization of this construct.

Conclusions

The study reveals that a high proportion of primary school students show low intention to enroll in elective science subjects in secondary school, primarily due to the perception of difficulty in the subject. It is also observed that boys perceive a higher cost in both science and mathematics, suggesting the need for specific educational measures to address these differences. Finally, a higher perceived cost in science appears to increase the intention to take elective courses, which could indicate that perceived challenges may be viewed as motivating opportunities; an aspect that opens avenues for future research. Overall, these findings highlight the urgency of intervening to improve interest in science starting from the primary education stage.

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Cognitive demand in Mathematics assessment criteria of the Galician curriculum: teaching implications

Demanda cognitiva en criterios de evaluación de Matemáticas del currículo de Galicia: implicaciones docentes

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Abstract

The purpose of this research is to identify and quantify the cognitive demand associated with the assessment criteria of Mathematics subjects in the Secondary Education curriculum of the Autonomous Community of Galicia, in order to detect possible imbalances regarding mathematical domains and academic years, whose correction leads to an improvement in curriculum implementation. The study analyzes the cognitive processes from Bloom's taxonomy, as revised by Anderson and Krathwohl, and those of the PASS model (*Planning, Attention, Simultaneous and Successive Processing*).

To achieve this, a multimethod investigation with a concurrent nested design is

conducted, comprising a descriptive content analysis and a statistical treatment of the data. An *ad hoc* data collection form, validated by experts and with acceptable reliability, is used to record the cognitive processes associated with each criterion. A total of 678 cognitive processes across 186 assessment criteria were counted. The cognitive demands are evaluated using specific numerical scales, expressly created respecting the hierarchical order of the processes.

The results show that the *applying* and *understanding* processes of the revised Bloom's taxonomy are the most and least frequent, respectively. Additionally, *simultaneous processing* is the most involved process in the PASS model, whereas *successive processing* is the least. The mean scores of the cognitive demands of the processes are slightly above the mean scores of the scales, with a higher cognitive demand observed in the revised Bloom's taxonomy for the fourth-year course. It is concluded that it is important for the teacher to adjust, as much as possible, the cognitive load of tasks to the demands imposed by the assessment criteria, without compromising the individual characteristics of the students. This research facilitates that task and allows the design of didactic scenarios with a cognitive balance between the domains involved and their assessment.

Key words: cognitive processes, assessment criteria, curriculum, mathematics, Secondary Education.

Resumen

El propósito de esta investigación es identificar y cuantificar la demanda cognitiva asociada a los criterios de evaluación de las asignaturas de Matemática del currículo de Educación Secundaria Obligatoria de la Comunidad Autónoma de Galicia, para detectar posibles desequilibrios respecto a los sentidos matemáticos y cursos académicos, cuya corrección lleve a mejorar la implementación del currículo. Se analizan los procesos cognitivos de la taxonomía de Bloom, revisada por Anderson y Krathwohl, y del modelo PASS (*Planificación, Atención, procesamiento Simultáneo y Sucesivo*).

Para ello, se realiza una investigación multimétodo con un diseño anidado concurrente que consta de un análisis de contenido de enfoque descriptivo y un tratamiento estadístico de los datos. Se utiliza una ficha de registro elaborada *ad hoc*, validada por expertos y con aceptable fiabilidad, para recoger los procesos cognitivos en cada criterio. Se contabilizan 678 procesos cognitivos en 186 criterios de evaluación. Las exigencias cognitivas se valoran mediante sendas escalas numéricas, creadas expresamente respetando el orden jerárquico de los procesos.

Los resultados muestran que los procesos *aplicar* y *comprender* de la taxonomía revisada de Bloom son los de mayor y menor frecuencia, respectivamente. Además, el *procesamiento simultáneo* es el proceso PASS más implicado y el *sucesivo*, el menos. Las puntuaciones medias de las demandas cognitivas de los procesos se sitúan ligeramente por encima de las medias de las escalas, detectándose para la taxonomía revisada de Bloom,

una mayor exigencia cognitiva en cuarto curso. Se concluye sobre la importancia de que el docente amolde, en lo posible, la carga cognitiva de las tareas a la demanda que los criterios de evaluación imponen, sin menoscabo de las características personales del alumnado. El presente estudio facilita esa labor y permite diseñar situaciones didácticas con equilibrio cognitivo entre los sentidos que abarcan y su evaluación.

Palabras clave: procesos cognitivos, criterios de evaluación, currículo, matemáticas, Educación Secundaria.

Introduction

Cognitive processes are “the procedures carried out by human beings to acquire knowledge, in which very diverse faculties are involved, such as intelligence, attention, memory, and language, which may operate either consciously or unconsciously” (Suárez, 2016, p. 5). Regarding those involved in learning, the American psychologist and pedagogue Benjamin Bloom publishes, in the mid-20th century (1956), a taxonomy bearing his name, based on two types of thinking skills: lower-order thinking skills (LOST), namely *knowledge*, *comprehension*, and *application*, and higher-order thinking skills (HOST), which include *analysis*, *synthesis*, and *evaluation*. Subsequently, Anderson and Krathwohl (2001) revise this taxonomy, structuring the cognitive dimension into six major categories, expressed in the infinitive form to emphasize their dynamic nature. Arranged from lower to higher levels of complexity, these categories are *remember*, *understand*, *apply*, *analyze*, *evaluate*, and *create*. Abbreviated as RBT (*Revised Bloom’s Taxonomy*), each category represents objectives to be achieved as learning outcomes. Such authors conceptualize these processes as follows: *remembering* involves retrieving information; *understanding* consists of explaining ideas or concepts; *applying* means using information in another familiar situation; *analyzing* entails breaking information into components to explore insights and relationships; *evaluating* involves justifying a decision or course of action; and *creating* is based on generating new ideas, products, or perspectives.

In the field of mathematics, the cognitive processes involved in the

Revised Bloom's Taxonomy incorporate characteristics specific to the area of knowledge as direct complements. For instance, symbols, concepts, formulas, propositions, or operational procedures are recalled; reasoning processes, theorems, or explicit data from exercises are understood; mechanical procedures or methods for solving similar tasks are applied; abstract expressions, the rationale behind hypotheses, or relationships between different notions are analyzed; various approaches to reaching a solution or techniques for tackling the same problem are evaluated; and interpretative graphs, innovative proposals, or extrapolations to other mathematical contexts and scientific-social disciplines are created. According to Radmehr and Drake (2018), this taxonomy holds the greatest potential for the entire educational process in mathematics.

On the other hand, the so-called PASS theory of intelligence, formulated by Das et al. (1994), postulates the existence of four cognitive processes involved in mental activity, which typically operate in an interrelated manner: *planning*, *attention*, *simultaneous processing*, and *successive processing*. *Planning* involves designing or developing a work plan; *attending* refers to selecting and maintaining focus on a specific stimulus; *simultaneous processing* entails integrating separate stimuli into a whole; and *successive processing* consists of establishing the sequential order of a series of stimuli.

These PASS processes are closely linked to the actions required for solving mathematical tasks. Thus, *planning*, which is the predominant cognitive process in mathematics, enables the development of methods for solving problems when solutions are not immediately apparent (Tellado, 2001); *attention* facilitates intense and sustained concentration to perform a specific mathematical task (Iglesias-Sarmiento et al., 2017); *simultaneous processing* is correlated with number identification, automatic execution of operations, and problem comprehension (Deaño et al., 2006), and *successive processing* is associated with calculation sequence, mental arithmetic, and the step-by-step resolution of problems (Iglesias-Sarmiento et al., 2014).

Different studies have examined the enhancement of PASS processes in mathematical learning. Chronologically, Kirby and Williams (1991) identify difficulties related to *planning*, such as reliance on random and inadequate solutions, the use of incorrect strategies, and failure to implement the "trial-and-error" method effectively. Tellado (2001) proposes an intervention

model for the class-group that improves *planning* functions in arithmetic operations through self-reflective verbalization. Iglesias-Sarmiento et al. (2014) highlight a significant relationship between performance in verbal memory, processing speed, PASS processes, and numerical competence, with *simultaneous* and *successive processing* emerging as predictors of arithmetic performance. Specifically, in students with learning difficulties, Iglesias-Sarmiento et al. (2017) confirm that *simultaneous processing* is the only PASS process that predicts arithmetic problem-solving ability. Additionally, *attention* plays a crucial role in activating higher-order reading comprehension skills (Turégano, 2019), meaning that failure to understand or correctly interpret the statement of a mathematical task may be attributed to deficits in this process. Furthermore, Deaño et al. (2023) demonstrate that the Cognitive Training Program for Mathematics Modules, which focuses on calculation skills and problem-solving based on *planning* and *simultaneous processing*, is effective in improving mathematical performance and the PASS processes of the students.

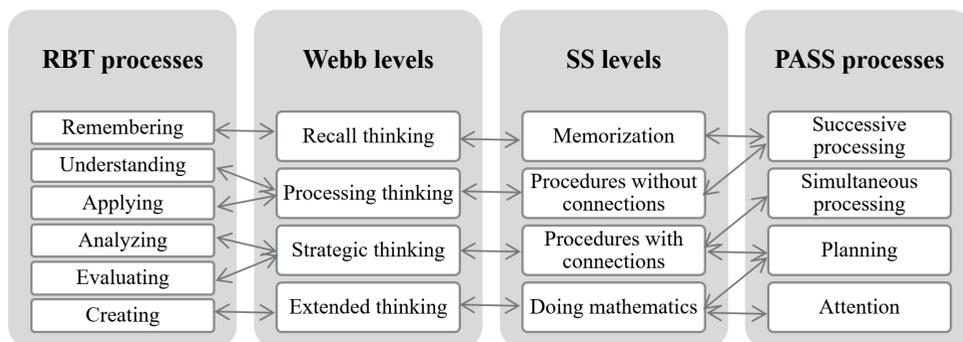
At the same time, the level of complexity of thinking required of students to complete a given task is referred to as cognitive demand or *Depth Of Knowledge*, abbreviated as DOK. At the end of the 20th century, Webb (1997) develops a cognitive demand model with four levels, ranked from least to most complex: *recall thinking*, *processing thinking*, *strategic thinking*, and *extended thinking*. In a specifically mathematical context, Smith and Stein (1998) develop a theoretical model to evaluate this framework. Abbreviated as SS, it consists of four categories, ordered from lower to higher complexity: *memorization*, *procedures without connections*, *procedures with connections*, and *doing mathematics*. This model has only been validated for arithmetic problems, and it does not fully apply to other types of mathematical tasks. Benedicto et al. (2015) modify it to determine the cognitive demand of complex activities based not only on the problem statements, but also on how students solve them. For the cognitive evaluation of geometric tasks, Benedicto (2018) assigns values of 1, 2, 3, and 4 to the SS categories in increasing order of complexity, giving a value of 0 to incorrect solution strategies and unanswered questions. Although originally designed for the cognitive assessment of tasks, Ramos and Casas (2018) apply this model in the field of educational

standards and mathematics textbooks in the Algebra block, finding a lack of proper cognitive demand alignment between them. Pincheira and Alsina (2021) also use the SS levels to analyze the cognitive demand of mathematical tasks designed by prospective primary education teachers. Although these authors identify a variety of mathematical tasks, they find that those tasks with a low level of cognitive demand predominantly prevail.

For its part, the *National Council of Teachers of Mathematics* (2014) has accredited the DOK model to assess both the activities proposed to students, allowing for the design of tasks suited to different purposes, including differentiated instruction, and addressing students with different abilities. Olivares et al. (2020) emphasize the importance of ensuring that the mathematical tasks included in curricula reflect an appropriate DOK level. Furthermore, Parrish and Bryd (2022) argue that the consistent implementation of “cognitively demanding” tasks enhances students’ conceptual understanding of mathematics.

The Webb, SS models, and the RBT and PASS cognitive processes exhibit certain interconnections. In the field of mathematics, considering the actions specified in each of them, we establish the correspondences presented in Figure I.

FIGURE I. Correspondences between the RBT, Webb, SS, and PASS models



Source: Compiled by the authors

Regarding curricular aspects, Sarmiento and Sarmiento (2023) conducted a study linking the RBT cognitive processes with the descriptors of

key competencies in the Primary Education curriculum, to highlight their relationships with knowledge areas and identify potential groupings. Their results show five groups: 1) Artistic Education, related to Linguistic Communication Competence and Cultural Awareness and Expression Competence; 2) Digital Competence; 3) Mathematics and Physical Education, linked to Mathematical, Science, Technology, and Engineering Competence (STEM) and Entrepreneurial Competence; 4) Natural, Social, and Cultural Environment Knowledge, along with Civic and Ethical Values Education, grouped under Citizenship Competence, Personal, Social, and Learning-to-Learn Competence; 6) Spanish Language and Literature and Foreign Language, associated with Multilingual Competence. Thus, their findings confirm that Mathematics contributes to the development of two key competencies: STEM and Entrepreneurial Competence.

Concerning the Secondary Education curriculum (ESO), the study highlights the importance of *assessment criteria* and *mathematical domains*. Assessment criteria play an essential role in the educational process, as they establish a set of fundamental knowledge, that integrates skills, competencies, and attitudes in each facet of the subject, ensuring that learning is considered satisfactory. Cognitively, Organic Law 3/2020, which amends Organic Law 2/2006 on Education (LOMLOE), stipulates that achievement indicators for assessment criteria should incorporate cognitive processes in various application contexts and be connected to all mathematical domains. Subsequently, Royal Decree 217/2022 establishes the framework and minimum educational requirements for this stage, defining its objectives, key and specific competencies, assessment criteria, fundamental knowledge, and learning scenarios. Specifically, the structure and curriculum of ESO in the Autonomous Community of Galicia are outlined in Decree 156/2022, which defines assessment criteria as “benchmarks indicating the expected levels of student performance in situations or activities related to the objectives of each subject or area at a given stage of their learning process”. Each assessment criterion is linked to a subject objective. However, López (2022) disapproves of them for being merely indicative and, consequently, are difficult to interpret when unequivocally determining students’ academic achievement.

In the field of mathematics, real-life problems are solved concerning

quantity, the shape and size of objects, and the randomness of events. Each of these variables requires specific knowledge and skills, collectively known as *mathematical domains*. The content of Mathematics subjects is structured around six domains: numerical, metric, geometric, algebraic, stochastic, and socio-affective. Each of these encompasses a distinct set of actions aimed at fostering students' mathematical competence. These domains enable content to expand its link to academic years through transversal connections, allow for the functional application of knowledge, and provide the flexibility needed to establish interconnections between them (Royal Decree 217/2022). It is important to emphasize that the socio-affective domain should not be considered the least mathematical. On the one hand, it includes enthusiasm for rational thinking and strategies that strengthen self-esteem when challenged by incorrect problem-solving approaches, difficulties in grasping certain concepts, operational errors... On the other hand, in its role in promoting gender equality, it offers an approach to mathematics designed to prevent female students from perceiving themselves as less capable than their male counterparts. Additionally, it ensures that collaborative learning is structured so that all students actively participate in each assigned task, fostering peer support and preventing disengagement. Furthermore, mathematical domains are not isolated categories, so certain knowledge belongs to more than one; this is the case for operational knowledge, which is addressed both from a numerical and from an algebraic domain.

Ruiz-Hidalgo et al. (2019) highlight the inherent global nature of mathematical domains, as it places equal emphasis on conceptual understanding and the development of computational skills and techniques. Furthermore, the interaction between mathematical content and domains has been analyzed by the Spanish Mathematics Committee (2021), which presented a study identifying the content areas that should receive more or less focus at different educational stages to effectively develop mathematical domains.

With the aforementioned references, the present research aims, as a general objective, to identify the cognitive processes associated with the Revised Bloom's Taxonomy and the PASS model, within the assessment criteria of Mathematics in the ESO curriculum in the Autonomous Community of Galicia. All of this with the purpose of identify potential "cognitive mis-

matches” in this educational stage and propose relevant recommendations for improving their implementation in the classroom. Accordingly, the specific objectives are:

- To determine the predominant cognitive demand within the assessment criteria for each mathematical domain.
- To quantify the cognitive demands present in the assessment criteria in relation to the academic year.

Method

The present study is part of a broader research project (Tugores, 2024) aimed at determining the relationship between cognitive processes and the mathematics curriculum in ESO, knowing and analyzing both its curriculum and the most commonly used didactic materials by teachers for the instruction of the subject. The present study focuses exclusively on the curricular perspective.

A multimethod research approach is adopted, following a concurrent nested design with a dominant model (Hernández-Sampieri, 2006). The method guiding the study, used to identify cognitive demand, is qualitative and is enriched with quantitative data and a descriptive approach, allowing for the quantification of the demands present in the assessment criteria and facilitate the characterization and manifestation of a given phenomenon by assessing various components or dimensions (Hernández-Sampieri, 2006).

In Spain, each autonomous community establishes its own ESO academic curricula; for this study, the curriculum of Galicia is selected. A content analysis of Decree 156/2022 is conducted, where the units of analysis correspond to the assessment criteria in mathematics. These criteria are categorized according to mathematical domains and academic years. As noted by Colás and De Pablos (2012), content analysis is the most appropriate methodological approach for the study of legislation. Thus, a total of 186 assessment criteria are analyzed, whose distribution by academic years and domains is shown in Table I.

TABLE I. Assessment criteria by academic years and mathematical domains

		Academic years					Total
		1st	2nd	3rd	4st A	4st B	
Domains	Numerical	5	5	6	6	7	29
	Measurement	5	5	4	3	5	22
	Spatial	7	7	6	6	6	32
	Algebraic	8	8	8	9	8	41
	Stochastic	8	8	8	8	7	39
	Socio-affective	5	5	5	4	4	23
	Total	38	38	37	36	37	186

Source: Compiled by the authors

Instrument

For data collection, an *ad hoc* rubric is used for each mathematical domain, adopting a double-entry table format, in which the RBT and PASS cognitive processes associated with each of the assessment criteria in Decree 156/2022 are indicated (see Tables III and IV). Given that the contents of each academic year are sequentially linked to those of preceding years, the assessment criteria exhibit the same continuity. The rubric was reviewed and validated by three experts, two from the area of Didactics of Mathematics and one with extensive psychometric knowledge, all of them familiar with the variable being quantified. (Hernández-Sampieri, 2006).

The application of the RBT and PASS scales to the units of analysis yielded Cronbach's alpha coefficients of .748 and .726, respectively, confirming their reliability. The rubric was independently applied to the assessment criteria by two of the authors, achieving a high level of inter-rater agreement (Cohen's kappa coefficient = .821), and, in cases of discrepancy, the assessment of a third evaluator was considered.

The development of this instrument is based on multiple sources: Decree 156/2022, the cognitive processes defined in RBT, the processes of the PASS model, and the corresponding cognitive actions outlined in Anderson and Krathwohl (2001). For instance, a definition corresponds to *remember-*

ing, a classification to *understanding*, a demonstration to *applying*, a graph to *analyzing* and *evaluating*, and designing a project to *creating*.

Data Analysis

The data analysis is carried out based on two categories (RBT and PASS) and ten subcategories: six from the RBT category (*remembering*, *understanding*, *applying*, *analyzing*, *evaluating*, and *creating*) and four from the PASS category (*planning*, *attention*, *simultaneous processing*, and *successive processing*). Table II presents these categories, subcategories, and the meaning of the latter.

TABLE II. RBT and PASS categories

Category	Subcategory	Meaning
RBT	Remembering	Utilizing memory to generate or retrieve definitions, facts, or lists, or to recite previously learned information.
	Understanding	Constructing meaning from different types of functions, whether through written or graphical messages, or activities such as interpreting, exemplifying, classifying, summarizing, inferring, comparing, or explaining.
	Applying	Carry out or use a procedure through execution or implementation.
	Analyzing	Decomposing materials or concepts into their constituent parts to determine how these parts relate to each other, how they interconnect, or how they correspond to a broader structure or overarching purpose.
	Evaluating	Making judgments based on criteria and standards through verification and critique.
	Creating	Assembling elements to form a coherent or functional whole; reorganizing components into a new pattern or structure through generation, planning, or production.

PASS	Planning	The use of effective strategies to achieve the desired goal and self-regulation, which is explained through functions such as cognitive control in selecting the appropriate function.
	Attention	The capability to perform functions that enable focused and selective cognitive activity, within a defined time frame.
	Simultaneous processing	The ability to integrate separate stimuli into a unified whole and recognize the relationships between them, as well as to make analytical inferences that may result from higher-order thinking.
	Successive processing	A process in which stimuli are recalled by placing them in a specific sequential order, defined as memory.

Source: Adapted from Anderson & Krathwohl (2001) and Ergin (2021).

Numerical cognitive scales are defined for the RBT and PASS processes. Unlike the scale proposed by Benedicto (2018), these scales are applicable to all types of mathematical problems. The levels of cognitive demand are quantified by assigning a numerical value to each RBT and PASS process within respective ordinal scales, which serve as measurement instruments. The RBT processes are ranked according to their position in the cognitive hierarchy: *remembering* = 1, *understanding* = 2, *applying* = 3, *analyzing* = 4, *evaluating* = 5, and *creating* = 6.

Regarding PASS processes, the assessments of Pérez-Álvarez and Timonedá-Gallart (2000) are considered: “Sequential processing is less complex, less intricate, and more primitive than simultaneous processing, which, in turn, is less intricate than the planning function, the most phylogenetically advanced” (p. 612) and Turégano (2019): “In the PASS model, attention is a more complex process because, in addition to focusing resources on the stimulus to be processed and resisting interference from irrelevant ones, it also involves the minimal necessary mental activation required for a specific task to occur” (p. 10). Accordingly, PASS processes are ranked from least to most complex as follows: *successive processing* = 1, *simultaneous processing* = 2, *planning* = 3, and *attention* = 4. These scales are termed uniform gradations, based on the hypothesis of “cognitive equidistance” between their respective processes, analogous to the cognitive gradation introduced in a mathematical education, context by Benedicto (2018). The designed matrices are structured with criteria as rows and cognitive processes as columns. A value of 0 is assigned if

a process is not involved in a given criterion, while the corresponding scale value is recorded if it is.

A frequency analysis of the cognitive processes is carried out, by mathematical domains and academic years, using the χ^2 test; the calculation of the mean scores of cognitive demand, along with their confidence intervals, and the comparisons of such scores, using the Kruskal-Wallis H test and the Mann-Whitney U test. Statistical computations are carried out using SPSS software. In all hypothesis tests, decisions are made at a .05 significance level. A difference is considered statistically significant when the *p-value* is less than .05.

Procedure

All assessment criteria in the mathematics curriculum for all academic years of Compulsory Secondary Education are labelled, identifying the associated level of cognitive demand. In the curriculum for the fourth year, a distinction is made between Mathematics A (applied mathematics) and Mathematics B (academic mathematics), which are denoted as 4th A and 4th B, respectively. Following the guidelines of Decree 156/2022, each label consists of the prefix CE (Assessment Criterion), followed by two digits. The first digit corresponds to a mathematical domain (1 = numerical, 2 = measurement, 3 = spatial, 4 = algebraic, 5 = stochastic, and 6 = socio-affective), while the second digit indicates the criterion's order within the list. Examples of this labelling system are presented in Tables III and IV. These tables illustrate the process of mapping the cognitive processes from RBT and PASS, respectively, to the assessment criteria in two mathematical domains, for this implementation and analysis, Excel is used.

TABLE III. RBT cognitive processes in an assessment criterion for 1st and 2nd year of ESO

Block 2: Measurement domain						
	Remem- bering 1	Under- standing 2	Ap- plying 3	Ana- lyzing 4	Evalu- ating 5	Cre- ating 6
1st and 2nd year						
CE2.1. Investigate and ver-ify simple conjectures in a guided manner, by analyzing patterns, properties and relationships.				x	x	

Source: Compiled by the authors.

TABLE IV. PASS cognitive processes in an assessment criterion for 1st, 2nd and 3rd year of ESO

Block 6: Socio-affective domain				
	Succes- sive pro- cessing 1	Simultane- ous process- ing 2	Plan- ning 3	Atten- tion 4
1st, 2nd and 3rd year				
CE6.2. Manage personal emotions and develop mathematical self-concept as a tool for fostering positive expectations when facing new mathematical challenges.	x		x	

Source: OCompiled by the authors.

Results

In the Mathematics subjects of ESO, a total of 186 assessment criteria have been analyzed, but considering their propaedeutic nature, only 57 are distinct (30.6%). Within these criteria, a total of 678 cognitive processes have been identified. Next, the frequencies and the existence of significant differences in cognitive demand presented by the evaluation criteria are examined, according to the RBT and PASS processes.

RBT Cognitive Processes in the Assessment Criteria

Overall, the *applying* process stands out as the most frequent (122, 28.7%), while *understanding* is the least frequent (33, 7.8%). The frequencies of *remembering* (63, 14.8%), *evaluating* (65, 15.3%), and *analyzing* (66, 15.5%) are relatively similar, whereas the frequency of *creating* is slightly higher (76, 17.9%). The χ^2 test supports statistically significant difference among these proportions ($p < .001$), but no significant differences are found among the proportions of *remembering*, *analyzing*, *evaluating*, and *creating* ($p = .867$).

Table V presents the distribution of RBT cognitive processes across different mathematical domains.

TABLE V. Frequencies of RBT processes by mathematical domains

		<i>Remembering</i>	<i>Understanding</i>	<i>Applying</i>	<i>Analyzing</i>	<i>Evaluating</i>	<i>Creating</i>
Domains	Numerical	10	5	16	13	5	11
	Measurement	4	4	20	8	8	10
	Spatial	14	6	24	8	10	13
	Algebraic	14	7	22	11	15	19
	Stochastic	16	6	25	16	12	18
	Socio-affective	5	5	15	10	15	5
	Total	63	33	122	66	65	76

Source: Compiled by the authors

In each mathematical domain, the predominant process is *applying* (along with *evaluating* in the socio-affective domain), while the least frequent is *understanding* (tied with *evaluating* in the numerical domain). When considering the total set of criteria, *applying* remains the most prevalent process; secondly, *creating* emerges, indicating a high level of cognitive demand. The χ^2 test does not detect significant difference in the distribution presented in Table V ($p = .654$). The distribution of the socio-affective domain clearly differs from the others; however, when compared to the aggregated remaining domains, no significant difference is observed ($p = .061$).

In some cases, the *applying* process is inherently embedded within the wording of the assessment criterion, as seen in: “**solve** mathematical problems, by mobilizing the necessary knowledge and applying appropriate tools and strategies” (numerical domain, first three academic years). On the other hand, the *understanding* process is often accompanied by others, as illustrated in: “**reformulate** mathematical problems both verbally and graphically, interpreting data, the relationships between them, and the posed questions while utilizing the necessary technological tools” (algebraic domain, 4th A), where *applying* and *creating* also play a role.

Actions such as debating, expressing opinions, or making judgments are actions closely linked to the formulation of strategies for solving mathematical tasks, particularly, to the cognitive process of *evaluating* (Anderson & Krathwohl, 2001). These actions are required in various criteria related to the socio-affective domain, such as: “actively **collaborate** in teamwork, respecting different opinions, communicating effectively, thinking critically and creatively, and making informed decisions and judgments” (socio-affective domain, 1st, 2nd, and 3rd year).

The distribution of RBT cognitive processes across academic years is presented in Table VI.

TABLE VI. Frequencies of RBT processes in assessment criteria by academic year

		<i>Remembering</i>	<i>Understanding</i>	<i>Applying</i>	<i>Analyzing</i>	<i>Evaluating</i>	<i>Creating</i>
Academic years	1st	14	7	22	12	12	13
	2nd	15	6	22	12	11	12
	3rd	15	6	23	12	10	13
	4th A	10	8	27	15	17	19
	4th B	9	6	28	15	15	19
Total		63	33	122	66	65	76

Source: Compiled by the authors

In all academic years, *applying* and *understanding* occupy the first and last positions, respectively. The assessment criteria for the first, second, and third years of ESO are nearly identical, as are those for 4th A and 4th B. Across the first three years, 21 out of 23 criteria (91.3%) are repeated, while in the fourth year, 23 out of 34 distinct criteria (67.6%) coincide. This situation explains why Table VI reflects nearly identical quantities for each cognitive process across the first three years on one hand, and the two fourth-year courses on the other, with frequency differences not exceeding two points. For this reason, Table VII is prepared, grouping the academic years into two distributions.

TABLE VII. Frequencies of RBT processes by grouped academic years

		<i>Remembering</i>	<i>Understanding</i>	<i>Applying</i>	<i>Analyzing</i>	<i>Evaluating</i>	<i>Creating</i>
Academic years	1st, 2nd and 3rd	44	19	67	36	33	38
	4th A and 4th B	19	14	55	30	32	38
Total		63	33	122	66	65	76

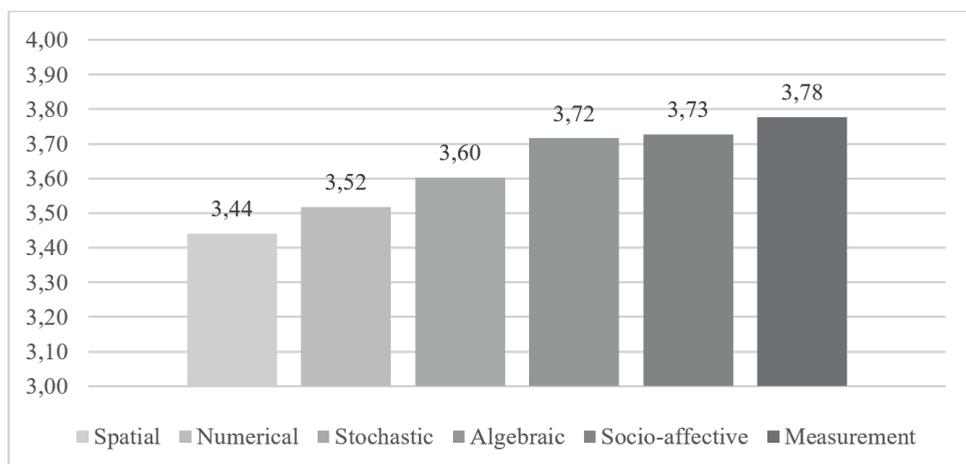
Source: Compiled by the authors

In the first three years, the predominant process is *applying*, which corresponds to an intermediate level of cognitive demand, followed by *remember-*

ing, the lowest-hierarchy RBT process. In the two fourth-year courses, *applying* remains the most frequent process, but it is followed by *creating* (the highest-hierarchy cognitive process). The χ^2 test does not indicate significant difference in the distribution shown in Table VII ($p = .231$).

The RBT cognitive demand, considering the mean score based on the uniform gradation of all processes within the assessment criteria, is 3.62 ($\sigma = 1.63$), exceeding the scale mean (3.5) and falling between the values of *applying* (3) and *analyzing* (4). This mean corresponds to 5.25 on a 0-to-10 scale, with a 95% confidence interval of (4.94, 5.56). The mean scores by mathematical domain can be observed in Graph I.

GRAPH I. Mean level of RBT cognitive demand for each mathematical domain



Source: Compiled by the authors

The measurement domain (3.78) exhibits the highest RBT cognitive demand, primarily due to the minimal involvement of *remembering* and *understanding* processes in its assessment criteria. The mean scores obtained by the socio-affective domain (3.73) and algebraic domain (3.72) are very close. The Kruskal-Wallis H test supports the equality of these means ($p = .838$).

For the combined first three years of ESO, the mean score on a 0-to-10 scale is 4.92, while for the two fourth-year courses, it is 5.66. The Mann-Whitney U test rejects the equality of these means ($p = .025$), indicating that cognitive

demand is higher in the final year (4th A and 4th B).

PASS Cognitive Processes in the Assessment Criteria

Simultaneous processing is the most frequently occurring cognitive process (80, 31.6%), while *successive processing* is the least frequent (52, 20.6%). *Planning* and *attention* exhibit similar frequencies (61, 24.1%, and 60, 23.7%, respectively). The χ^2 test does not indicate significant difference among these proportions ($p = .383$). Table VIII presents the frequencies of PASS cognitive processes for each mathematical domain.

TABLE VIII. Frequencies of PASS processes by mathematical domains

		<i>Planning</i>	<i>Attention</i>	<i>Simultaneous processing</i>	<i>Successive processing</i>
Domains	Numerical	8	8	10	7
	Measurement	4	6	13	6
	Spatial	9	10	18	4
	Algebraic	19	17	11	9
	Stochastic	16	14	13	16
	Socio-affective	5	5	15	10
Total		61	60	80	52

Source: Compiled by the authors

Simultaneous processing is the predominant process for all domains, except for algebraic and stochastic ones, in which *planning* stands out. In the stochastic domain, *planning* appears alongside *successive processing* in equal measure. The χ^2 test does not support significant difference in the distribution presented in Table VIII ($p = .106$), a conclusion that would be reached with greater certainty if the algebraic and stochastic domains were excluded ($p = .605$).

An example of *simultaneous processing* can be observed in the criterion: “**relate** mathematical knowledge and experiences to form a coherent whole” (4th A). Meanwhile, the criterion: “**communicate** information, **using** appropriate mathematical language to describe, explain, and justify reasoning, pro-

cedures, and conclusions”, which belongs to the first three years of Secondary Education, illustrates the emphasis placed on *planning* within the stochastic domain.

Table IX displays the distribution of PASS process frequencies by course levels, grouping the first three years together and, separately, the two fourth-year courses corresponding to Applied Mathematics and Academic Mathematics.

TABLE IX. Frequencies of PASS processes by grouped academic years

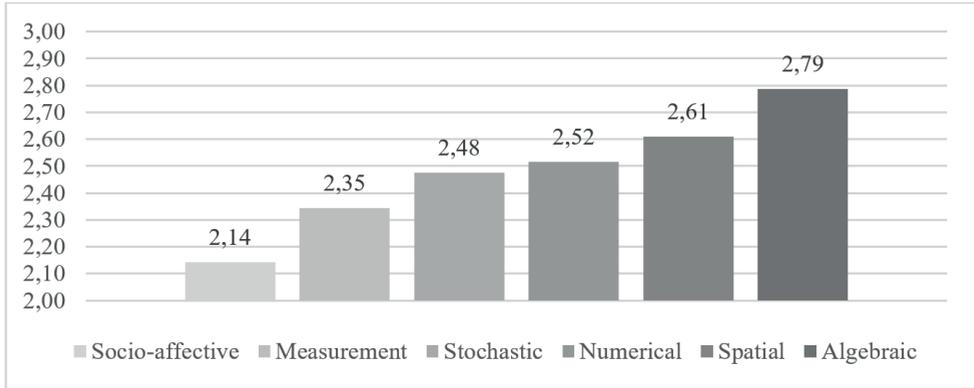
		<i>Planning</i>	<i>Attention</i>	<i>Simultaneous processing</i>	<i>Successive processing</i>
Academic years	1st, 2nd and 3rd	37	35	53	33
	4st A and 4st B	24	25	27	19
Total		61	60	80	52

Source: Compiled by the authors

Simultaneous processing stands out as the most frequent process in the first three years. In the fourth year, all cognitive processes exhibit a similar distribution. The χ^2 test does not indicate significant difference in the distribution of values shown in Table IX ($p = .793$).

Regarding PASS cognitive demand, the mean score across all processes is 2.51 ($\sigma = 1.07$), closely aligning with the scale mean (2.5). This mean corresponds to 5.03 on a 0-to-10 scale, with a 95% confidence interval of (4.59, 5.56). The mean scores by mathematical domain are graphically represented in Graph II.

GRAPH II. Mean level of PASS cognitive demand for each mathematical domain



Source: Compiled by the authors

All score values fall within the range of 2.14 to 2.79, with the mean being exceeded in the numerical, spatial, and algebraic domains. The Kruskal-Wallis H test supports the acceptance of score equality among these domains ($p = .263$). Regarding academic years, the mean score for 1st, 2nd, and 3rd years is 2.47, while for 4th A and 4th B, it is 2.58. The U test allows for accepting their equality ($p = .424$).

In summary, the obtained results are shown in Table X, which presents the highest and lowest frequencies of RBT and PASS processes, as well as cognitive demand across mathematical domains and academic levels.

TABLE X. Frequencies and cognitive demand of RBT and PASS processes

	Processes	RBT	PASS
Frequency	Highest/Lowest	Applying/Understanding	Simultaneous processing/ Successive processing
	Proportions by domains	Different	Equal
	Proportions by academic years	Equal	Equal

Cognitive demand	Mean (0-to-10 scale)	5.246	5.033
	By domains	Same	Same
	Domain with highest cognitive demand	Measurement	Algebraic
	By academic years	Different	Same

Source: Compiled by the authors

Discussion and Conclusions

The aim of this study has been to analyze the distribution of the RBT and PASS processes associated with the assessment criteria in Mathematics for Compulsory Secondary Education, as well as to quantify and assess their cognitive demand considering different mathematical domains and academic years. This assessment has been possible through the introduction of a uniform gradation for each cognitive model.

Regarding distribution, the fact that, within the assessment criteria, *understanding* (33) and *applying* (122) represent the least and most significantly present RBT processes, respectively, suggests a preference for ensuring that students can effectively utilize the knowledge they acquire, while less emphasis is placed on assessing the extent to which they internalize it. It is likely assumed that using a formula, a rule, a postulate... inherently implies an understanding of the mathematical objects being handled, or that applying theory is a suitable way to consolidate it. This imbalance could be mitigated by placing greater emphasis on aspects that require reflection, ensuring that students assimilate the meaning of mathematical concepts and propositions before applying them in context. Apart from these two extremes, the frequency of the highest hierarchy RBT process, *creating* (76), stands out with a slight difference, followed by the mid-level complexity process *analyzing* (66). This is very similar to *evaluating* (65), which also entails a high cognitive demand, and *remembering* (63), which represents the lowest cognitive demand. This distribution highlights a form of “cognitive centralization” within the assessment criteria, with a clear predominance of a mid-level cognitive process

(*applying*) and an equitable distribution of the remaining processes, except for *understanding*, which is notably underrepresented.

This distribution is also consistent across the different mathematical domains, where *applying* is always the most frequently identified cognitive process in the corresponding assessment criteria. However, differences are observed in second place: *creating* in the algebraic, stochastic, and measurement domains, associated with a high level of cognitive demand; *analyzing* is dominant in the numerical domain, representing a medium level of complexity; while *remembering* is the most recurrent in the spatial domain, associated with the lowest cognitive demand.

Considering the different academic years in ESO, by the fourth academic year, while *applying* remains the most frequent cognitive process, the two lower-order RBT processes (*remembering* and *understanding*) lose prominence in favour of the two higher-order ones (*creating* and *evaluating*), whose sum of frequencies more than doubles that of the first two. This shift suggests that *remembering* and *understanding* should already be mastered by the time students reach the final year of the stage.

Undoubtedly, a higher-order process may require less effort than a lower-order one; for instance, finding an immediate example is easier than recalling a long definition. Therefore, if this category were assessed numerically, an additional numerical value could be incorporated to the uniform gradations, establishing new and more comprehensive hierarchical cognitive scales. This aligns with the modification made by Benedicto et al. (2015) to the Smith and Stein (1998) model by introducing a category they call “required effort”.

On the other hand, given that *applying* is the most frequent RBT process, one would expect *successive processing* to be the predominant PASS process, as there is an established association between *applying* and *successive processing* (Figure 1). This is based on the fact that *applying* involves carrying out different mathematical sequences, such as, for example, the very common chain: recognizing a formula, linking operations to arrive at a solution, and verifying its correctness. However, the prevailing process, both in the analysis by mathematical domains and by academic years, is *simultaneous processing*.

The cognitive demands of RBT and PASS, as explicitly stated in the assessment criteria, can be considered to meet a “cognitive passing grade”.

These demands are balanced across mathematical domains. However, a higher RBT demand, but not PASS, is observed in the two Mathematics subjects of the 4th year of ESO compared to those of the first three academic years. This “cognitive leap” could be mitigated by increasing the level of rigor at the end of the 3rd year. Therefore, the role of the teacher is crucial, as they are responsible for the implementation of the curriculum in the classroom. As Ramos and Casas (2018) state, “if a true alignment between educational standards, textbooks, and assessments is ensured, it helps improve curriculum implementation processes, better evaluate assessment results, and engage teachers in improvement processes” (p. 1134).

Although mathematics teachers, according to Parrish and Byrd (2022), strive to maintain the cognitive demand of the tasks implemented, this does not necessarily contribute to increasing mathematical competence. Having a quantification of curricular demand now makes it possible to establish a threshold that the level of rigor should not exceed, if the goal is to increase the complexity of classroom tasks, as suggested by these authors. In the case of pre-service teachers, Pincheira and Alsina (2021) confirm a trend of this group (81.8%) to design low-level tasks for their students. If the cognitive demand levels of the RBT and PASS processes in the examined assessment criteria are considered separately, the resulting distributions are 51.3% and 47.8%, respectively. This suggests that future teachers set the “cognitive bar” relatively low compared to students’ theoretical capabilities and contrary to the expectations set by the assessment criteria.

Ramos and Casas (2018) argue that if the proportional distribution of Smith and Stein’s (1998) levels is similar across educational standards, textbooks, and assessments, then curriculum implementation improves, assessment results gain more significance, and teachers become more involved. Nevertheless, these authors do not provide a numerical representation of cognitive demand. The fact that this study does so, in a broader context than learning standards, enables comparisons between different demands, independent of how cognitive processes are distributed.

The results obtained have implications for teaching practice, as this study can serve as a reference for teachers when selecting tasks that align with assessment criteria, based on their respective mathematical domains

and the academic year of ESO in which they are implemented. This selection should consider students' specific characteristics, prior classroom activities, and the reinforcement or attenuation of particular content, among other factors. Teachers can periodically adjust the cognitive demand of activities to ensure that their complexity and the distribution of cognitive processes remain aligned with curricular requirements. Additionally, classroom diversity can be addressed by balancing the cognitive load of tasks with students' abilities, especially in lower ESO levels. Furthermore, understanding the distribution of cognitive processes by mathematical domains and their associated cognitive demands may be valuable when designing didactic scenarios that integrate multiple mathematical domains, if the aim is for such interactions between mathematics and real-world contexts to align with what the curriculum establishes.

Limitations

A key limitation of this study lies in the inherent subjectivity involved in determining the cognitive processes associated with certain assessment criteria, whose wording is overly generic. To mitigate this issue, a dual coding process has been implemented in such cases.

Another difficulty has been the inability to compare the values obtained in this research with "individualized" cognitive demands, those that result from the specific way each teacher designs certain tasks to practically develop the assessment criteria.

Prospective

One of the advantages of this analysis is that it provides an instrument and procedure that can be extrapolated to Mathematics curricula at other educational stages or even to different subjects, enabling appropriate comparisons by academic years or mathematical domains within the framework established by Decree 156/2022. Furthermore, cognitive demand levels could be assessed in Secondary Education Mathematics curricula from other autonomous communities, allowing for corresponding analogies or differences to be established.

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Value-added in Education: Mapping the contributions from Portugal and Spain

Valor Añadido en Educación: mapeando las contribuciones de Portugal y España

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Abstract

This study examines Portugal and Spain's contributions to Educational Effectiveness Research (EER) and value-added (VA) measures from 2000 to 2024 by analyzing 37 research papers published in Spanish (51%), English (38%), or Portuguese (11%). The analysis addresses three key questions: the knowledge production landscape, influential authors and articles, and the field's evolving thematic structure. The scoping review method is used with bibliometric analysis, content analysis, and co-occurrence analysis through author keywords. The review covers 73 authors, with 32% of articles featuring international collaborations. Results show that 52% of studies use longitudinal data, and 19% rely on international large scale assessments. The majority of the articles (65%) consider school performance in mathematics, while 40% also address reading performance. Regarding the purpose, VA models are mainly used for educational improvement and evaluation, with no studies on school choice or high-stakes accountability. The study emphasizes the need for greater visibility and integration of EER in these regions and offers recommendations for future research, contributing to evidence-based educational policy and practice in Southern Europe.

Keywords: evaluation; mapping science; school effectiveness; school improvement; value added model.

Resumen

Este estudio examina las contribuciones de Portugal y España a la Investigación

sobre la Eficacia Educativa (IEE) y a las medidas de valor añadido (VA) desde 2000 hasta 2024, mediante el análisis de 37 artículos de investigación publicados en español (51%), inglés (38%) o portugués (11%). El análisis aborda tres preguntas clave: el panorama de la producción de conocimiento, los autores y artículos influyentes, y la estructura temática en evolución del campo. Se utiliza el método de scoping review con el uso de análisis bibliométrico, análisis de contenido y de co-ocurrencia a través de palabras clave del autor. La revisión abarca a 73 autores, y el 32 % de los artículos presentan colaboraciones internacionales. Los resultados muestran que el 52 % de los estudios utiliza datos longitudinales y el 19 % se basa en evaluaciones internacionales. La mayoría de los artículos considera los resultados escolares en matemáticas, mientras que un 40% también trata los resultados en lectura. En cuanto al propósito, los modelos VA se emplean principalmente para la mejora y evaluación educativa, sin estudios sobre elección de escuelas o rendición de cuentas de alto impacto. El estudio enfatiza la necesidad de una mayor visibilidad e integración de la IEE en estas regiones y ofrece recomendaciones para investigaciones futuras, contribuyendo a políticas y prácticas educativas basadas en evidencia en el sur de Europa.

Palabras clave: eficacia escolar; evaluación; mapeo científico; mejora educativa; modelo de valor añadido.

Introduction

For over 50 years, educational research has consistently demonstrated that teachers and schools have a profound and lasting impact on children's development. This is especially evident from educational effectiveness research (EER), which focuses on the effectiveness of both teachers and schools in shaping educational outcomes (AERA-American Educational Research Association, 2015; Longford, 2012; Morganstein & Wasserstein, 2014; Reynolds et al., 2014). The concept of value-added (VA) in education and the use of value-added measures as a foundation for educational effectiveness research are essential (Sammons et al., 2016). The concept of VA in education emerged in the literature motivated by the field of educational evaluation. It first appeared in a study on the economics of education (Hanushek, 1971) that focused on evaluating teachers' effectiveness, specifically the relationship between teachers' characteristics and students' learning gains. It was later dis-

cussed in an educational statistics article (Bryk & Weisberg, 1976), where the concept, its theory, and modeling were presented as the most appropriate methodological approach for evaluating the impact of interventions and programs aimed at improving student learning outcomes.

Hanushek (1971) formulates and explores three research questions that continue to be relevant and timely for educational policy worldwide: “(1) Do teachers make a difference? (2) Do schools operate efficiently? (3) What are the relevant characteristics of teachers and classrooms?” (Hanushek, 1971, p. 280). Acknowledging that the main interest of the conceptual and statistical model for the purpose of public policy focuses on the influence of school characteristics on students’ outcomes, the author explains the paper motivation as follows:

Past studies have given ambiguous answers to these questions, largely due to inadequate data. Specifically, no data set, which supplies accurate historical information on educational inputs at an individual level, has been available. (Hanushek, 1971, p. 280).

Those three relevant research questions had ambiguous findings until 1976 due to the use of inadequate data. In other words, until that time, no dataset had simultaneously satisfied two essential conditions: (1) use of accurate historical data on educational inputs; (2) consider student as the statistical unit of observation/analysis.

Bryk and Weisberg (1976), in turn, present the rationale for the “Theory of the value-added strategy”,

Rather than assuming a static input-output model, we prefer to think of an educational program as a dynamic intervention in an ongoing development process. [...] The effect of any innovative program is to change the growth rate for the group of individuals exposed to it. The aim of the evaluation then is to compare the actual growth observed under an intervention with that which would have occurred in its absence. (Bryk & Weisberg, 1976, p. 130).

EER and VA research have primarily engaged the scientific community in the United States of America (USA) and in the United Kingdom (UK). Since the 1990s, there has been remarkable progress in addressing and resolving issues in statistical methodology, allowing for a more rigorous analysis

and precise interpretation of both individual student performance and school academic achievement (Saunders, 1999). The adoption of a statistical model that incorporates the multilevel structure of the educational population (Plewis, 1997) became a methodological requirement in EER (Creemers, 2006; Goldstein, 1997). It addresses data characteristics—longitudinal design and multilevel structure—while theoretically justifying their necessity for understanding educational effectiveness and its multi-level impact on student development.

Six key methodological requirements frequently referred to EER (Goldstein, 1997; Mortimore, 1991; Strand, 2011, 2016) are outlined: (1) Assessment of prior knowledge and its inclusion as independent variable: This is typically achieved through the administration of standardized tests to evaluate students' baseline knowledge in order to be part of the determinist component of the model; (2) Longitudinal data analysis: Studies must account for the longitudinal nature of learning by utilizing data that includes repeated observations of both the outcome variables (often standardized test scores) and relevant covariates for each student over time; (3) Multilevel population structure: It is essential to recognize and incorporate the hierarchical structure of the data, such as students nested within classrooms or schools, to ensure accurate analysis; (4) Consideration of external factors: Studies must account for out-of-school factors that could influence student learning, such as socioeconomic status or cultural background, which are key determinants of educational outcomes. In addition, studies focusing on the stability of value-added scores or changes in school performance over time must meet the following extra criteria. (5) Longitudinal data with multiple cohorts: A minimum of three cohorts is required to track performance changes and ensure robust longitudinal analysis; (6) Change-oriented analysis: To estimate long-term school performance, a focus on change-oriented analysis is essential (Gray et al., 1995), including methods that capture shifts in school effectiveness over time (Kyriakides & Creemers, 2008).

In addition, over the last 50 years the literature on VA includes the debate on its definition (Arias & Soto, 2009; Braun, 2005; Saunders, 1999), on the theoretical, conceptual and statistical modelling (Ballou et al., 2004; Ferrão & Goldstein, 2009; Goldstein, 1997; Ray et al., 2009), methodological

requirements and data quality (AERA, 2015; Morganstein & Wasserstein, 2014), or the purpose and use of value-added measures (Darling-Hammond, 2015; OECD, 2008). The sharp development of EER is evident in hundreds of papers or handouts published (Reynolds et al., 2014; Thomas et al., 2016). In mainland Europe studies are referred to in Belarus, Cyprus, Hungary, France, the Netherlands, Norway, Belgium, and Germany (Creemers, 2007; Thomas et al., 2016). Other European countries such as Greece, Italy, Portugal and Spain are mentioned by Creemers, Stoll, Reezigt, and ESI Team (2007; p.826-858) regarding the Effective School Improvement (ESI) project, which run from 1998–2001. Murillo (2003) notes that research in Ibero-American countries has expanded over time, largely due to strong institutional support. Additionally, it is observed that a significant number of studies have been conducted in Spain. Regarding Portugal, the author refers to the participation in the ESI project. Little is known about the EER conducted in Spain and Portugal.

Recent literature reviews (Everson, 2017; Levy et al., 2019) unequivocally show the findings on VA and/or EER in many other countries, showing the densification and globalization of knowledge on the subject. Levy et al. (2019) highlight the sharp increase in the total number of empirical publications on VA models since 2002. Among the 370 articles forming the corpus, 253 (68%) were conducted in the USA, 46 (12%) in the UK, and 71 (19%) in the remaining 24 countries covered by the review. Of these 71 studies, 50 were conducted in a European Union (EU) member country. Levy et al. (2019; Table A4) found that 14% of studies were from Germany, Austria, Belgium, Czech Republic, Cyprus, Slovakia, Spain, France, Italy, Malta, the Netherlands, Poland, Portugal, and Sweden. Only three articles focused on Portugal or Spain. Everson (2017) examines VA modelling for educational accountability, focusing on methodological challenges in estimating teacher or school effects. The study highlights three key concerns: (1) research often overlooks critical issues raised by theorists and critics, (2) interactions between different issues and assumption violations remain understudied, and (3) fundamental challenges in VA modelling persist, requiring deeper reflection on its philosophical foundations. Among the 82 studies reviewed, only three address EER in Portugal or Spain, though experience and academic networks

suggest a much larger body of original research.

As shown above, since its inception, EER has been associated with the purpose of ensuring quality and equity in education. Yet, more than 50 years later, it remains a largely unknown field of research in many countries, including Portugal and Spain. In fact, even within Portugal and Spain, there is limited awareness of the scope, characteristics, findings, and potential of EER and VA studies for educational improvement, policy, and practice. Moreover, the challenges and limitations of these studies, which still need to be addressed, provide significant research opportunities for the next generation of educational researchers. Limited knowledge is a key obstacle to the development of science across all fields, but it is especially impacting education, where science for policy plays a crucial role for achieving social justice.

This article aims to fill this gap and contribute to the EER literature by examining the current state of scientific research on EER or VA conducted by researchers affiliated with Spanish and Portuguese institutions. Considering the impact of collaborative networks between Portuguese or Spanish authors and researchers from Portuguese- or Spanish-speaking countries, the dissemination of knowledge through this article also contributes to advancing EER in countries where it has yet to gain prominence. The analysis is designed to support scholars, early-career researchers, and policymakers better understand the field's evolution, identify key milestones, and recognize patterns in knowledge growth and dissemination over time. In doing so, it also aims to highlight trends for future research and provide evidence-based insights for policy and practice. To achieve these goals, the study is guided by three research questions that map the scientific contributions:

- What is the landscape of knowledge production represented by the corpus?
- What authors and articles have had the greatest scholarly impact on the education literature?
- What is the content and intellectual structure of the knowledge ?

Answering the question 1 involves mapping and analyzing the distribution, structure, and trends within the corpus. A descriptive analysis is

conducted in order to analyze the distribution of publications over time, identifying periods of increased or decreased productivity; to identify the most prolific journals within the corpus; to identify key authors, their contributions, and collaborative networks.

Answering the question 2 involves analyzing citation patterns that is identifying the authors and articles with the highest citation counts, as they are typically the ones with the greatest impact.

To answer question 3, it is necessary to uncover the main conceptual foundations of the corpus by identifying the key concepts and models that underpin it. This is achieved by analyzing key works from question 2, tracking changes in intellectual structure, identifying emerging trends and shifts, and mapping research clusters and study contexts.

Methods

This scoping review examined the corpus, enabling science mapping to identify knowledge production patterns through bibliographic metadata, unlike meta-analysis or qualitative synthesis, which integrate research findings (Arksey & O'Malley, 2005). The process of collecting scientific articles that meet the purposes of this study unfolded as follows. Firstly, the automatic selection carried out with the following query in the Scopus indexed database, was conducted. This database was selected as it is trustworthy bibliometric data sources for large scale knowledge assessments (Baas et al., 2020), broadly covering the topic.

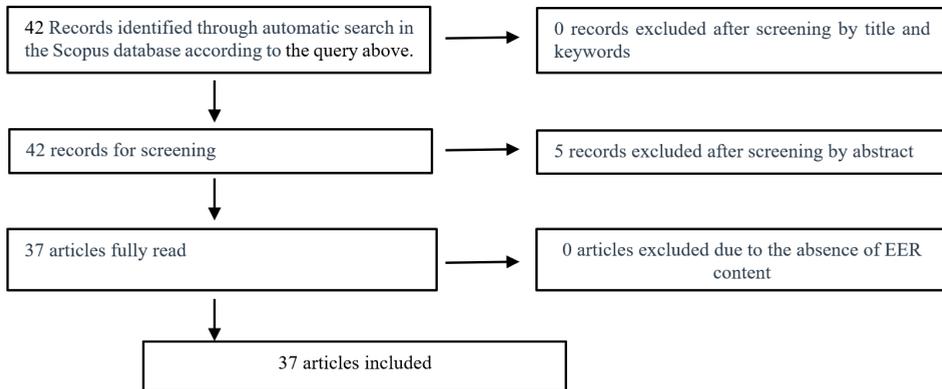
TITLE-ABS-KEY ("growth curve" OR "growth model" OR "value added" OR "value-added" OR "school effectiveness" OR "educational effectiveness") AND TITLE-ABS-KEY (multilevel OR hierarchical) AND PUBYEAR > 1999 AND SUBJAREA (soci) AND (LIMIT-TO (AFFILCOUNTRY , "Spain") OR LIMIT-TO (AFFILCOUNTRY , "Portugal")) AND (LIMIT-TO (DOCTYPE , "ar"))

The same is to say that we searched in title, abstract, and keywords for articles on “value added” or “value-added” or “growth curve” or “growth model” or “school effectiveness” or “educational effectiveness”, which also include “multilevel” or “hierarchical”, were published since January 2000, whose authors were affiliated to Spanish or Portuguese organizations, and journals’ subject area is social sciences. This automated selection process yielded 42 research articles. Next, based on abstract screening, five articles were deemed out of scope and excluded. A full-text analysis confirmed these exclusions, resulting in a final corpus of 37 articles. In this regard, the included articles describe scientific research that cumulatively meets the following criteria:

- SER as conceptual framework, in particular regarding value-added (VA) model or growth model;
- Authored or coauthored by scientists affiliated to Portuguese or Spanish organizations;
- Published in a peer-reviewed journal indexed in Scopus between 2000 and 2024.
- Available with a complete manuscript in Portuguese, Spanish, Catalan, or English;
- Title, abstract, and keywords available in English.

Diagram I presents a flowchart outlining the study selection process. Data file in *.csv format is available as supplementary material, allowing for reproducibility or further analyses. In other words, making it possible to reanalyze these data, using the same methods to get the same results; allowing for replicability, potentially conducting to a new study.

DIAGRAM I. Flowchart of the article selection process



Source: Compiled by the authors

The analyses were conducted in two sequential steps: firstly, a bibliometric approach; second, the content analyses of article clusters. Bibliometric analysis was performed using Bibliometrix, a comprehensive science mapping software package for R (Aria & Cuccurullo, 2017). Thematic analysis is conducted using the authors' keywords, with a thesaurus of synonyms enabled. For example, 'value-added' is consistently used over 'value added,' and 'hierarchical linear model' is preferred over variations such as 'hierarchical linear models,' 'hierarchical linear modeling,' or 'hierarchical linear modelling'.

Results

Landscape of knowledge production represented by the corpus

Although the search was conducted after 1999, the corpus spans from 2006 to 2024 and includes 37 articles published in 24 different source titles. The annual production varies from 0 to four papers (Figure I). The total number of

authors is 73, with 32.4% involving international co-authorship. On average, there are 2.8 authors per article and 4 papers are single-authored. The number of author's keywords is 118.

FIGURE I. Annual trend of number of articles

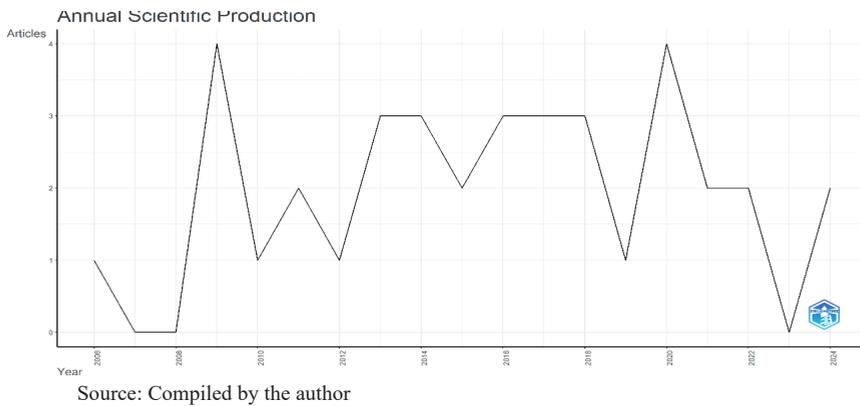
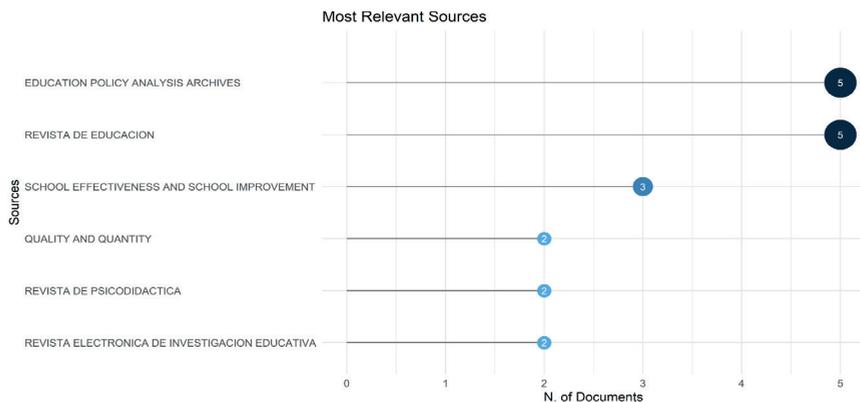


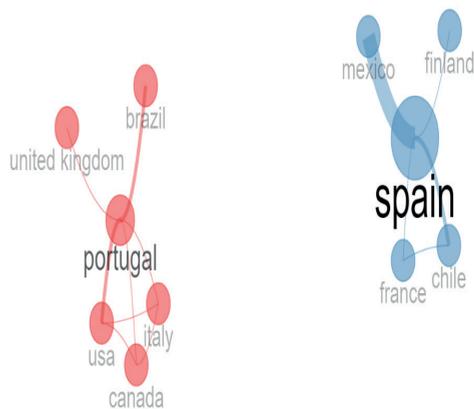
FIGURE II. Most relevant sources



Six source titles published 51% of the corpus, while the remaining 18 articles were published in 18 different source titles. According to Bradford's law, the core sources are Education Policy Analysis Archives, Revista de Educación, School Effectiveness and School Improvement (Figure II). Among

the six most representative source titles in the corpus, four are either multi-lingual or publish in two languages, Spanish or English. The majority of the articles were published in journals that use languages other than English, with 10.8% in Portuguese and 51.4% in Spanish. The remaining 37.8% articles were published in English. Regarding the disciplinary classification of the source titles, Education represents 95% of the corpus. For the purpose of this study, we used the classification of journals according to the Scopus area/category.

FIGURE III. Country collaboration network



Source: Compiled by the authors

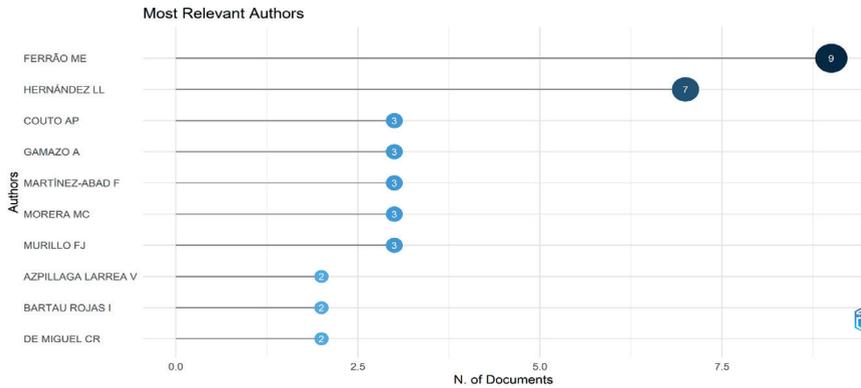
The country collaboration network (Figure III) reveals two distinct clusters of authorship with no connections between them. The left-hand cluster consists of Portuguese-affiliated authors collaborating with researchers from the USA, Canada, Italy, Brazil, and the UK, while the right-hand cluster features Spanish-affiliated authors working with colleagues from Finland, Mexico, France, and Chile. These two clusters had no connections, indicating no collaborative network between Portugal and Spain.

Authors and articles with the greatest scholarly impact

Seven authors have written or co-written at least three papers in the corpus

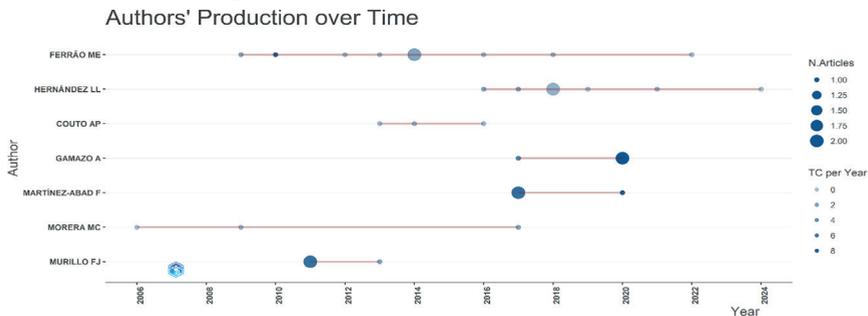
(Figure IV). Among the 73 authors, only three have publications spanning more than five years. Most authors either contribute sporadically to the field or primarily collaborate within different co-authorship networks and research themes (Figure V).

FIGURE IV. Most relevant authors



Source: Compiled by the authors

FIGURE V. Authors' production over time



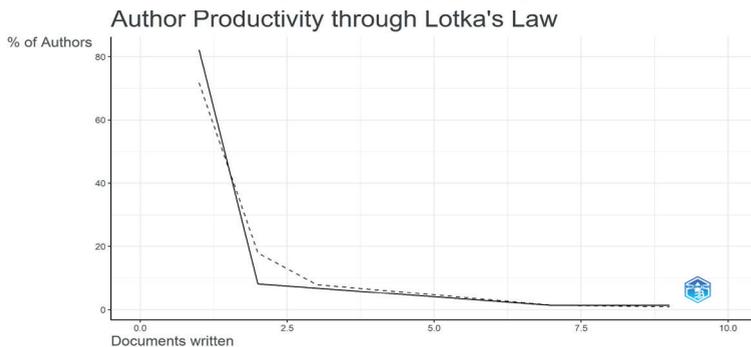
Source: Compiled by the authors

As shown in Figure VI, approximately 90% of the authors have contributed to at most two papers in the corpus. The other collaborative networks each consist of fewer than eight members. This graph illustrates Lotka's law, which describes the distribution of scientific productivity among authors. The

law states that a small number of authors contribute a disproportionately large number of papers, while the majority of authors contribute few. In Figure 6 can be observed that the number of papers written by an author ranges from 1 to 9, with the number of papers increasing as you move right in the horizontal axis. In turn, the Y-axis (% of Authors) shows the percentage of authors contributing a certain percentage of papers. The higher the percentage on the y-axis, the larger the group of authors contributing that number of papers. The graph characterizes by a steep decline at the start, since it starts very high on the left (near 90%) and drops sharply, meaning that the majority of authors (around 80-90%) have written very few papers of the corpus — likely 1 or 2. Then, a flattening curve meaning that, as the curve moves to the right, representing authors who have written more papers, the percentage of authors contributing steadily decreases and levels off near 0%. This suggests that only a small percentage of authors (6%) have contributed three or more papers, with an even smaller number producing a substantial body of work.

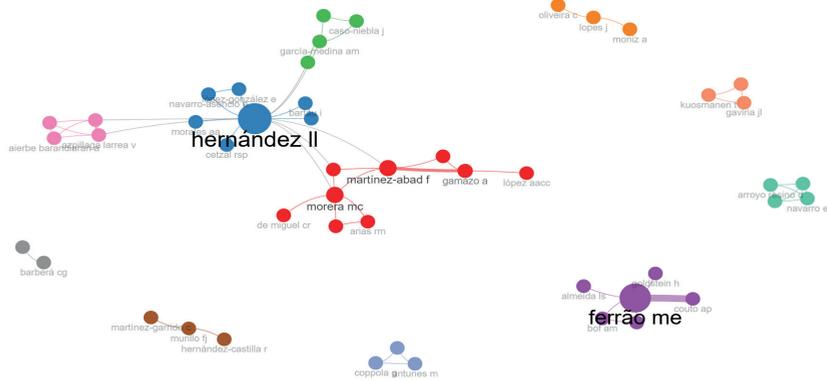
The collaboration network (Figure VII) reveals a strong cluster, highlighted in blue, centered around Hernandez L.L., who has direct or indirect scientific connections with 23 authors, most of them consisting of three clusters highlighted in red, green and pink.

FIGURE VI. Author productivity through Lotka's law



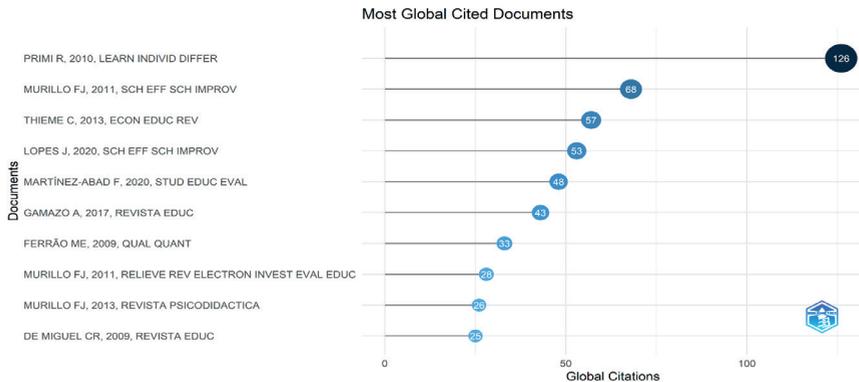
Source: Compiled by the authors

FIGURE VII. Collaboration network (Authors)



Source: Compiled by the author

FIGURE VIII. Most global cited articles



Source: Compiled by the authors

The content analysis of the 10 most global cited articles (Figure VIII) shows that they collectively investigate various factors influencing school effectiveness, student achievement, and teacher job satisfaction, using diverse methodologies like multilevel modeling, decision trees, and frontier approaches.

The content and the intellectual structure of the knowledge

The corpus covers several educational and social contexts, including the Autonomous Community of the Basque Country, Brazil, Chile, Italy, Mexico, Portugal, and Spain. It also includes articles that allow for the characterization and comparison of education in Latin American countries (Martínez-Garrido, 2017; Murillo & Martínez-Garrido, 2013; Murillo & Román, 2011) like Argentina, Bolivia, Brazil, Colombia, Cuba, Chile, Honduras, Mexico, Panama, Dominican Republic and Venezuela. Some studies using international large-scale assessment (ILSA) data analyze multiple countries, with a primary focus on OECD members. There is an impressive number of articles on the Autonomous Community of the Basque Country (Blanco et al., 2009; Hernández et al., 2016; Larrea et al., 2021, 2023; Morales et al., 2019). In analyzing the content of the corpus, specific characteristics were selected for the purposes of this study, grouped into six main categories: (1) Methodological and data quality requirements; (2) The education level targeted by the study; (3) The statistical unit used for inference; (4) The purpose of the VA approach; (5) The analyses of clusters of co-occurrence network; (6) Intellectual structure of the knowledge over time.

Methods and data quality requirements

By search design, all of papers use multilevel and/or growth models. Approximately 19% of the studies utilize ILSA data from the PISA, TIMSS, or TALIS surveys. Among the remaining studies, 52% employ longitudinal data, some of them have standardized or vertically aligned outcome scales. Most articles either provide a detailed description of the instruments and scale properties used or cite other works where these descriptions are thoroughly developed. Approximately 65% of studies consider mathematics performance as outcome variable, 40% consider performance in reading, and 35% consider both. Some studies consider non-cognitive student outcome variables (Murillo & Hernandez-Castilla, 2011; Santos et al., 2020) and Often statistical models that account for variables like prior achievement (in studies with longitudinal data) and socioeconomic status (SES) or similar proxies are ap-

plied. The corpus include articles with innovative methodological approaches such as VA based on growth curves with polynomial terms (Lopez-Martin et al., 2014), VA models adjusted for measurement errors (Ferrão & Goldstein, 2009), or educational performance based on nonparametric frontier methods (Thieme et al., 2013).

Level of education focused on in the study

Most articles refer to primary (ISCED 1) or elementary education (ISCED 2). They are mostly studies with empirical bases obtained from a representative sample of a clearly defined target population. For example, Murillo and colleagues (Murillo & Hernandez-Castilla, 2011; Murillo & Román, 2011) studied primary education in several Latin American countries, showing that while infrastructure and resources influence math and reading achievement, their impact varies across countries, underscoring the critical role of local context. Also Thieme et al. (2013) highlight the role of resources in Chilean primary education. Primi et al. (2010) tracked Cova da Beira students aged 11–14 over two years, testing them in math four times to examine the role of fluid intelligence in academic growth throughout elementary education. Other articles based on the Cova da Beira longitudinal study (Ferrão, 2009, 2012a; Ferrão & Couto, 2014; Ferrão & Goldstein, 2009) include participants from several grades from primary to lower secondary (ISCED 3) education. The longitudinal study conducted by Lopes et al. (2015) involves 2nd and 3rd grade students. The VA growth multilevel model for reading comprehension proposed by Lopez-Martin et al. (2014) is successfully tested in primary and secondary education students in Madrid. PISA-based studies (Arroyo-Resino et al., 2024; Gamazo et al., 2018; Lopez & Gamazo, 2020; Martínez-Abad et al., 2020; Miguel, 2009; Miguel & Castro-Morera, 2006) focus on 15-year-old students, most of whom are in secondary education. The study by Travitzki et al. (2016) refers to Brazilian candidates to higher education studies.

Focus on Teacher or School unit

The percentage of papers that apply multilevel regression or hierarchical lin-

ear models is 95%, with students as unit of analysis, nested in classrooms or schools. Teacher and teaching practices are central to the research objectives of Murillo and Martínez-Garrido (2013) "ISSN": "11361034", "abstract": "This article analyzes the impact of homework on language and mathematics performance of students in third year of primary education in Iberoamerica and identifies the most powerful features of homework. This is a three levels Multilevel study with a value added approach. The samples of this study are 5.603 students from 248 classrooms in third grade from 98 schools in 9 countries in Iberoamerica. This analysis uses data coming from standardized performance tests and questionnaires for teachers, students, and families. The results show that school performance improves if: (a, who use value-added approach to assess the influence of homework, and Lopes and Oliveira (2020) and Martínez-Garrido (2017), who examine teacher job satisfaction. The articles focused on the Autonomous Community of the Basque Country (Blanco et al., 2009; Hernández et al., 2016; Larrea et al., 2021, 2023; Morales et al., 2019) deal with topics addressing the relationship between school effectiveness and gender equality, schools as learning organizations and the focus on teacher training, and the relationship between education in values and school effectiveness. With the exception of Primi et al. (2010) and Lopes et al. (2015), articles in Portugal are directly related to common themes in VA in Europe. They address topics such as the selection of predictor variables and the consequences of that selection, the use of the VA model for improving education, the impact of measurement error on VA estimates, or the characteristics of research on school effectiveness in Portuguese-speaking countries, comparing the value-added model with the contextualized results model. In this regard, we can affirm that the analyzed corpus suggests that the VA model, in its multiple specifications, has been investigated in the Iberian Peninsula with a primary focus on improving the educational systems and holding the school accountable for inference.

Purpose or Objective of the VA Model

Building upon the previous analysis, the studies predominantly highlight the relevance of the VA model for school improvement (which includes enhanc-

ing student learning and development) and for the educational system evaluation, providing contributions to the educational assessment system. In general, the VA methodology is designed for diagnostic and educational improvement purposes (Ferrão, 2014; Ferrão & Couto, 2013; Gonzalez et al., 2018; Zúñiga et al., 2018), as well as for analyzing differential effectiveness, educational quality, and equity (Ferrão, 2022; Ferrão et al., 2018; Ferrer-Esteban, 2016) eficácia diferencial e equidade social realizadas através da aplicação de modelo multinível (UF, município, escola, aluno, including proposals that classify schools as high- or low-performing (Castro-Morera & Pedroza-Zuñiga, 2015; García-Jiménez et al., 2022; Lopez-Gonzalez et al., 2021; Martínez-Abad et al., 2017). None of the articles advocate for the adoption of VA for high-stake purposes for teachers or schools.

Clusters of co-occurrence network

The term “intellectual structure” usually refers to the underlying organization, relationships, and key themes or concepts that emerge from the corpus under analysis. We did it by analyzing the clusters of co-occurrence network that is based on authors’ keywords. The resulting diagram is presented in Figure IX, and shows several distinct interconnected clusters within the research corpus, each centered on key EER relevant themes. For this study, we selected the three clusters with the highest number of nodes: the School Effectiveness cluster (red), the Multilevel Model cluster (brown), and the Educational Quality cluster (green).

School Effectiveness Cluster (red): This cluster revolves around concepts aimed at improving school performance and quality. Keywords like “best practices”, “effective schools research”, “contextual effects”, “sense of belonging”, “academic achievement”, “educational assessment”, “teaching”, “teacher education” point to strategies for enhancing teaching and learning. The inclusion of “large-scale assessments”, “PISA”, “value-added model” and “linear and quadratic growth model” indicates a connection to international benchmarks and methodologies for measuring educational effectiveness. The keywords like “consistency”, “stability”, “school assessment”, “school effects”, and “school accountability” highlight the central focus of

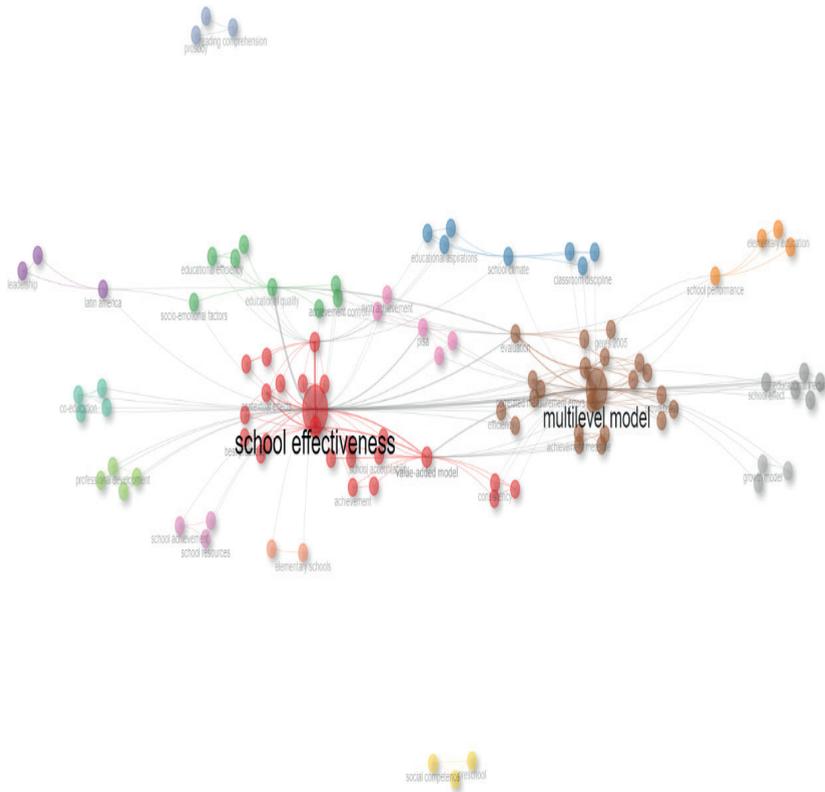
the School Effectiveness cluster, emphasizing themes related to evaluating and improving the performance and outcomes of schools. These keywords suggest a strong emphasis on measuring institutional effectiveness, ensuring accountability, and maintaining stable educational standards. This cluster reflects a commitment to identifying and implementing effective educational practices, particularly in diverse contexts such as Latin America (Chile and Mexico).

Multilevel Model Cluster (brown): This cluster emphasizes complex analytical frameworks used to assess educational outcomes. Keywords like “achievement measure”, and “differential effectiveness” highlight a focus on measuring student success across various dimensions, while terms such as “educational inequality”, “social equity”, “longitudinal study” and “growth model” suggest an interest in understanding how different factors influence equity and educational performance over time. This cluster indicates a nuanced approach to evaluating educational interventions and their impact on diverse populations. Specifically, fluid intelligence, through cognitive abilities (Numerical, Abstract, Verbal, and Spatial Reasoning), is strongly linked to initial math achievement and the rate of improvement over time. The topic of educational evaluation and its purpose are present through the keywords “evaluation”, “school/teacher effectiveness”, “school/teacher accountability”, “school/teacher improvement”. The keywords “latent variable multidimensionality,” “item response theory”, “measurement error”, “correlated measurement errors,” and “reliability” are central to the Multilevel Model cluster, indicating a focus on advanced statistical techniques used to analyze complex educational data. These terms suggest a strong emphasis on the precision and reliability of measurement models, particularly in assessing latent traits and addressing errors in data interpretation within hierarchical or multilevel structures.

Educational Quality Cluster (green): Focusing on the social and emotional aspects of education, this cluster includes keywords like “educational quality”, “achievement control”, “educational efficiency”, “educational evaluation”, “high schools”, “school success”, and “student evaluation”. These terms highlight the focus on assessing and improving various dimensions of education, including the effectiveness of schools, student performance, and the impact of both cognitive and socio-emotional factors on academic success, particularly in high school settings.

In general, the diversity of themes addressed contributes to a more comprehensive understanding of educational success factors across different educational systems and cultural environments.

FIGURE IX. Co-occurrence network (Author's keywords)



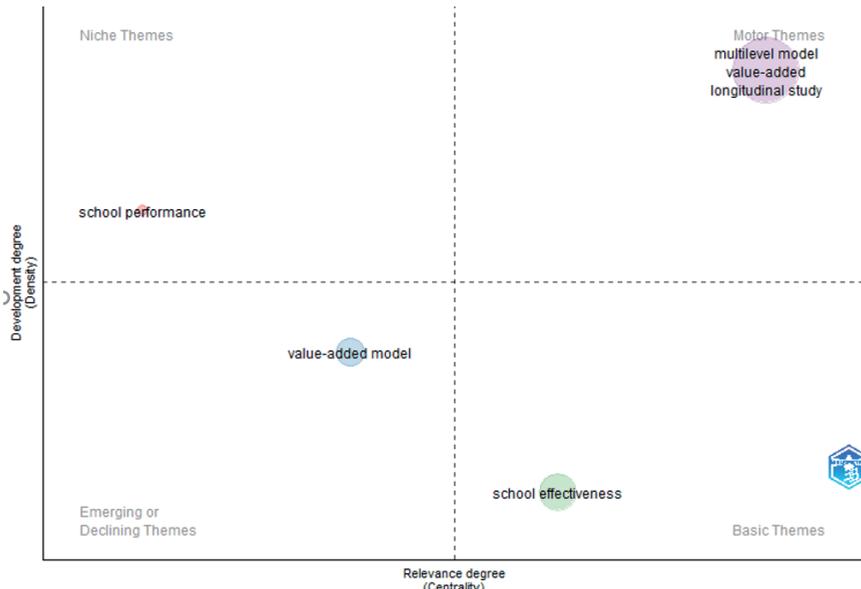
Source: Compiled by the authors

Intellectual structure of the knowledge over time

Having identified influential authors and papers that shape the field, the EER foundational concepts, framework issues and how they are interconnected, we will present and describe the thematic evolution network map in order to provide a comprehensive understanding of how research themes evolve over

time. The study period is divided into two distinct time slices (period 1 – 2006 to 2014; period 2 -2015 to 2024) to observe changes. The thematic evolution includes four main clusters in each period, each strongly related to the clusters above presented.

FIGURE X. Thematic evolution, 2006-2014



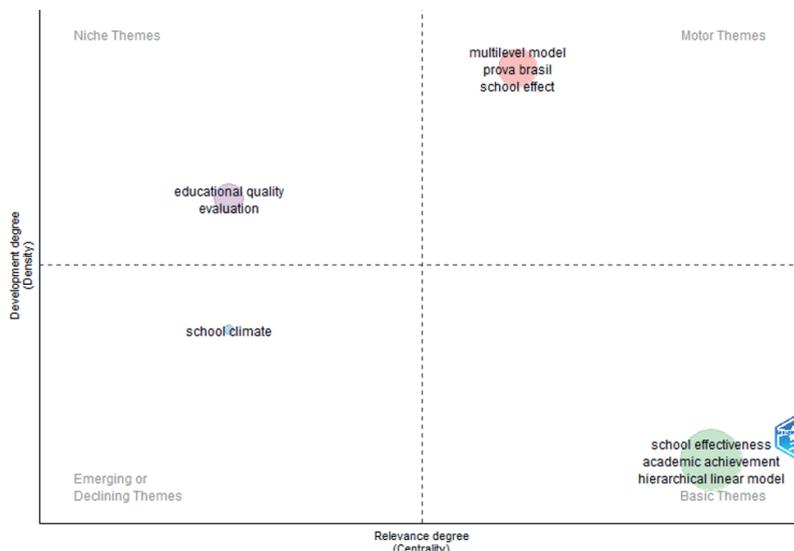
Source: Compiled by the authors

As observed in Figure X, the first period of research is marked by themes like multilevel model, value-added and longitudinal study as motor themes, it also includes school performance as niche theme. While in period 2, includes educational quality evaluation, school climate, and school effect assessed by Prova Brasil.

The thematic evolution of EER shows a shift in focus. In the first period (2006–2014), themes like multilevel models, value-added approaches, and longitudinal studies were central, with a strong emphasis on school performance. By the second period (2015–2024), attention shifted toward educational quality evaluation, school climate, and assessments like Prova Brasil,

indicating a broader focus on both the academic and environmental factors that influence educational outcomes. Ultimately, the intellectual structure of EER has evolved, with foundational concepts becoming more interconnected and diverse. The field has transitioned from a heavy focus on school performance and statistical models toward a more nuanced consideration of educational quality, accountability, and socio-emotional factors, reflecting the dynamic nature of educational research over time.

FIGURE XI. Thematic evolution, 2015-2024



Source: Compiled by the authors

Conclusion

This paper makes a significant contribution to the field of Educational Effectiveness Research (EER) by mapping the contributions of Portugal and Spain to the value-added in education from 2000 to 2024. Utilizing advanced bibliometric analysis and co-citation methods, the study provides an overview of the knowledge production, revealing the thematic and methodological trends

that have emerged over the past two decades.

By addressing the research questions, the paper identifies key authors and seminal articles that have shaped the discourse on value-added models in education, highlighting their impact on both regional and international scholarly conversations. The corpus features 32% international authorship, with 9% of authors contributing three or more papers. This pattern suggests a lack of continuity in international networks over time. Furthermore, it elucidates the intellectual structure of knowledge within the field, tracing how conceptual frameworks and research methodologies have evolved over time.

This research enhances the understanding of how value-added approaches are perceived and implemented in the educational contexts of Portugal and Spain. It also contributes to the broader Educational Effectiveness Research (EER) literature by providing insights from Spanish (51%), English (38%), and Portuguese (11%) publications, highlighting regional contributions that have often been overlooked. This review consolidates and analyzes existing research, incorporating studies in Portuguese (11%) and Spanish (51%). Notably, 89% of these articles remain uncited in recent English-language reviews. From the selection of 37 articles, only four have been cited in recent review articles on the field (Everson, 2017; Levy et al., 2019). Considering that the most recent literature review (Levy et al., 2019) mentions 26 countries with scientific production of 370 articles, and only 14% refer to European Union (EU27) countries, the 37 articles studied here make a decisive contribution to the development of the thematic as a scientific agenda.

In most studies, mathematics is the chosen dimension to quantify the students' cognitive development. The majority (95%) of studies based on EER-specific data collection demonstrate a high degree of rigor in meeting the criteria for instrument validation and scale adjustment for academic outcomes, indicating in-depth knowledge of the specific methodological requirements of school effectiveness studies. In general, the statistical models include students' prior achievement and socioeconomic status (SES) or a proxy, and other predictors. Such characteristics differ from most studies conducted in other regions. For example, Levy (2019) refers to 85% of the analyzed corpus as including prior achievement as a covariate, while only 2% include noncognitive predictors of achievement. Some articles' empirical evidence is

based on international large-scale surveys, such as PISA, TALIS and TIMSS, which use cross-sectional data by design. In these cases, prior achievement as a control variable is absent from the EER models. The ISCED 1 level of education is the most studied. Perhaps due to the demanding methodological requirements, none of the studies fully represents the universe at stake in the two countries, suggesting a significant opportunity for future educational research agenda.

Our results also suggest that the VA model, in its various specifications, has been investigated in the Iberian Peninsula with a primary focus on improving the educational system, reinforcing school autonomy, and enhancing the role of educational assessment in the cycle of public policies. None of the articles advocates for the adoption of VA for high-stakes purposes. Teachers and teaching practices make a difference. The evidence of differential effectiveness among schools supports the promotion of programs and measures aimed at enhancing schools and the broader educational system. However, the corpus suggests a general consensus that holding teachers or schools accountable using methodologies that fail to accurately assess their quality may do more harm than good (Everson, 2017). Our findings serve as a foundation for future research, encouraging a more nuanced exploration of educational effectiveness that integrates both local and global perspectives. Moreover, there remains a substantial need for further scientific research in the Iberian Peninsula to identify the key characteristics of effective teaching practices and factors that contribute to educational effectiveness.

The corpus reveals a slower pace of development and publication in Portugal and Spain compared to other regions (Murillo & Martínez-Garrido, 2019; Scheerens, 2014). It emphasizes the link between educational assessment and school improvement, along with key issues of quality and equity in education. While highlighting the region's existing knowledge and capacity, it also reveals the lack of investment in large-scale projects. However, implementing a value-added indicator system depends on the quality and quantity of variables used in the model, making governmental collaboration essential (Ferrão, 2012b). Since the 1990s, there has been significant progress in addressing statistical methodology issues, enabling more rigorous analysis and clearer interpretation of both individual student and school academic achieve-

ments (Saunders, 1999) These advancements have shed light on the intrinsic complexity of the challenges involved in evaluating educational effectiveness that, according to the intellectual structure of corpus' knowledge, in less than 20 years of VA research conducted by Portuguese and Spanish scholars, the major methodological challenges have been effectively tackled and resolved. Our findings indicate that, over time, the intellectual structure of EER has evolved, with foundational concepts becoming increasingly interconnected and diverse. The field has shifted from a strong emphasis on school performance and statistical models to a more comprehensive approach that considers educational quality, accountability for improvement, and socio-emotional factors, highlighting the dynamic nature of educational research.

Finally, the international perspective of this research highlights the strong global connections Portuguese and Spanish scholars have fostered, albeit separately. Such diverse international engagement points out the growing recognition of EER conducted in Iberia on a global scale. It also shows how both Portugal and Spain have become part of broader research ecosystems, collaborating across continents. However, despite these global links, the absence of collaboration between Portuguese and Spanish researchers signals a missed opportunity for regional knowledge exchange. Strengthening cross-border networks within the Iberian Peninsula could further integrate both countries into the global research community and foster solutions tailored to their shared educational challenges. Thus, to enhance the impact of EER and VA measures in Portugal and Spain, it is crucial to establish stronger collaborative networks between researchers in both countries. The absence of a collaborative link between Portuguese and Spanish scholars limits the exchange of ideas, best practices, and innovations in the field, potentially hindering the development of evidence-based educational policies. Policymakers should prioritize the creation of formal research partnerships, joint academic programs, and cross-border funding opportunities. By fostering collaboration between these two clusters, researchers can collectively address shared educational challenges, improve the quality of research, and develop region-specific solutions that enhance educational outcomes in both countries. This will also lead to greater integration of Southern European perspectives into the global EER dialogue, ensuring more inclusive and effective educational poli-

cies and practices.

This study has the limitation of mapping the topic based solely on articles indexed in Scopus, which, despite having the highest number of source titles in Portuguese and Spanish compared to the Education Resources Information Center (ERIC) and Web of Science, may still exclude relevant studies from other sources.

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Academic performance in the context of bilingual education

Rendimiento académico en el contexto de la enseñanza bilingüe

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Abstract:

This study examines factors impacting Mathematics and Science and Technology performance in sixth-grade primary education students in Castilla y León, Spain. The analysis focusses on scores in Mathematics and Science and Technology from questionnaires administered as part of the Final Individualized Assessment by the Junta de Castilla y León. The studied sample consisted of 1,652 sixth-grade students from 49 schools across various provinces of that region during the 2018–2019 academic year. The study considered variables previously identified in the literature as having an impact on academic performance: gender, geographic area, school ownership (public or private), socioeconomic and cultural status (ISEC), school absenteeism, grade repetition, and homework. Additionally, the study included a new variable — presence or absence of bilingual education in schools. The results revealed that bilingual education, when considered alone, does not impact academic performance in Mathematics or Science and Technology. However, when analyzed individually, gender and school ownership significantly affect Mathematics performance. Our data shows that higher scores are achieved by male and private school students. Furthermore, other factors such as socioeconomic status (ISEC), class attendance, grade repetition, and number of days spent doing homework were found to individually affect both Mathematics and Science and Technology performance. Academic performance improves as ISEC increases, absen-

teism decreases, grade repetition is avoided, and homework is completed on more days. Differences in performance were observed when analyzed regarding bilingual or non-bilingual education modalities. For example, Mathematics performance is higher in boys from autonomous bilingual sections than from non-bilingual schools.

Keywords: Academic performance, Academic achievement, Performance factors, Socioeconomic factors, Primary education, Bilingual education, Student evaluation.

Resumen

Este estudio explora los factores que influyen en el rendimiento en Matemáticas y en Ciencia y Tecnología de estudiantes castellano-leoneses del nivel de sexto de Educación Primaria. Se analizaron las puntuaciones en Matemáticas y Ciencia y Tecnología obtenidas a partir de cuestionarios que la Junta de Castilla y León aplicó, como parte de la evaluación individualizada final de etapa, a una muestra de 1652 escolares de 49 colegios de diferentes provincias de la comunidad en el curso 2018- 2019. Se analizaron variables explicativas que la literatura ya ha destacado como influyentes en el rendimiento académico: género, ámbito territorial, titularidad, ISEC, absentismo escolar, repetición de curso y deberes. Asimismo, se estudió también una variable novedosa que es la presencia o no de enseñanza bilingüe en los centros. Los resultados indicaron que la enseñanza bilingüe de forma aislada no influye en el rendimiento académico de las áreas de Matemáticas y de Ciencia y Tecnología. Mientras que el género o la titularidad estudiados individualmente sí condicionan el rendimiento en Matemáticas, de forma que los chicos y los centros concertados-privados poseen mejores rendimientos. Además, otras variables como el ISEC, las faltas a clase, la repetición de curso o el número de días empleados para hacer deberes analizadas individualmente influyen tanto en el rendimiento de Matemáticas como en el de Ciencia y Tecnología, incrementándose estos cuando el ISEC es mayor, se falta menos a clase, no se repite y se hacen más días los deberes. Cuando analizamos las variables en el contexto de las modalidades de enseñanza bilingüe observamos que sí existen diferencias entre los distintos tipos de centros. Entre ellas, los chicos tienen mejor rendimiento en Matemáticas en las secciones autonómicas bilingües que en los centros no bilingües.

Palabras clave: Rendimiento académico, factores que afectan al rendimiento, variables socioeconómicas, educación primaria, enseñanza bilingüe, evaluación del estudiante.

Introduction

Academic performance has been a perennial topic of interest in the field of education. Torres and Rodríguez (2006) define it as the level of knowledge relative to a given standard, while Vilches et al. (2018) interpret it as the effectiveness in achieving curricular objectives, reflecting the degree of learning acquired.

Martínez-Otero (2007), adopting a humanistic perspective, describes academic performance as “the output produced by students in educational institutions, typically expressed through school grades” (p. 34). Similarly, Caballero et al., Abello and Palacio (2007) emphasize that academic performance entails meeting goals, achievements and objectives of a program or subject, also expressed through grades.

As Grasso (2020) notes, academic performance is used to evaluate the effectiveness of the education system, encompassing both the level achieved by students and the level performed by teachers. Various tools have been used to measure academic performance, such as analyzing report card grades, which is considered a reliable and valid method (Edel, 2003).

To complement these tools, the Organic Law 8/2013 proposed a final evaluation for sixth-grade students (MECD, 2015). Article 21 establishes that an individualized assessment of Primary Education (PE) students must be conducted at the end of their stage to verify the degree of acquisition of linguistic communication competence, mathematical competence and basic competencies in science and technology (S&T), as well as the achievement of overall stage objectives (p. 16). This evaluation was conducted from the 2015/16 to the 2018/19 academic years on a sample basis for diagnostic purposes. The collected data generated several reports: one individualized report for each student regarding his/her acquisition of linguistic communication, mathematics and S&T competencies, issued also for their family and tutor; other report for teaching and school management teams; and an aggregated report regarding the reference territory for education authorities. These efforts aimed to establish improvement measures across all levels of the educational administration and by all its members (MECD, 2015). Given that educational powers are transferred to the Autonomous Communities in Spain, regional

administrations conducted these evaluations under the National Institute for Educational Evaluation guidelines (MEFP, 2019).

These evaluations provide a good context for analyzing PE student performance. However, it must be acknowledged that academic performance is a complex concept that often generates confusion (González et al., 2012), and its evaluation should consider students' contexts and realities. Thus, beyond definitions, it is essential to explore factors influencing or conditioning students' academic performance

Tejedor (2003), identifies multiple interrelated factors that condition academic performance, within a complex network where problems and causes are difficult to pinpoint. Torres and Rodríguez (2006) classify these factors into four categories: social and cultural, school-related, familial and personal. Several studies have investigated these factors. Regarding social and cultural aspects, research highlights families' socioeconomic factors (Pozo-Burgos et al., 2022; Chaparro et al., 2016), and father and/or mother education levels (Zambrano-Mendoza, 2019; Glick et al., 2011). For schoolchildren, studies focus on the school environment (Barreto & Álvarez, 2017; Buckman et al., 2021), teacher influence (Ambussaidi & Yang, 2019; De la Torre & Ávila, 2002) and school quality (Willms, 2010). Familial factors address parents' attitudes toward their children as perceived positively or negatively by them (Chaparro et al., 2016; Zambrano-Mendoza et al., 2019). Finally, personal factors include intellectual aptitudes (Castejón & Vera, 1996), self-concept (Chávez-Becerra et al., 2020; Redondo & Jiménez, 2020), self-esteem (García et al., 2006; Tejada, 2018) and social competence (Torres et al., 2020).

The context surrounding the students may include factors not encompassed within the previously mentioned categories, which may condition their academic performance. One such factor could be bilingual education. According to Vinuesa and Izquierdo (2019), bilingual education refers to an educational model in which exposure to a second language (a foreign language) serves as a medium for accessing non-linguistic knowledge. It involves the use of two or more languages as a medium of instruction for part or all of the school curriculum. Báez and González (2013) further define bilingual education as an approach where any subject content can be taught in both languages, with both serving instrumental purposes.

In Castilla y León, two types of bilingual schools coexist: autonomous bilingual sections (SAB) and schools with the British Council Bilingual Education Program (PEB-BC).

The SABs were established under Order EDU/6/2006, which regulates the creation of SABs in publicly funded “schools and defines bilingual sections as schools that, once authorized, use a foreign language to teach content of certain areas or non-linguistic subjects” (p. 781). These schools are required to offer a minimum of two and a maximum of three non-linguistic subjects taught in a foreign language, with no more than 50% of total student instructional hours delivered in that language.

Neither the LOMCE (the educational law in effect at the time of this study; BOE, 2013) nor the current LOMLOE law (BOE, 2020) explicitly specifies which subjects must be taught in a foreign language, leading to variations among schools. Typically, subjects such as Natural Sciences, Social Sciences, (or their combination, Environmental Knowledge, that emerged after the LOMLOE), Art, Music or Physical Education are taught in English. Most schools primarily teach Natural Sciences in English (Vega-Agapito et al., 2021, Consejería de Educación, Ciencia y Universidades, 2023) and Mathematics is never taught in a language other than the native one.

The PEB-BC program was established through a collaboration agreement signed in 1996 between the Ministry of Education and the British Council Spain Foundation. Its main objective is to teach English language and culture through an integrated curriculum (Falcón-Díaz et al., 2019). In this program, non-linguistic subjects taught in English are specifically defined by legislation as Environmental Knowledge, Artistic Education, and Physical Education. During the PE stage, students receive between 10 and 12 hours of instruction in English per week (Falcón-Díaz et al., 2019).

Both SAB and PEB-BC fall under the “partial” bilingual programs, offering immersion close to 50% in the second language. These programs differ significantly from “transitional” programs (Baker and Wright, 2021), where students begin instruction in their native language, but eventually transition to using the second language as the medium of instruction. Schools with PEB-BC programs align more closely to bicultural bilingualism as defined by Molina (2003), whereas SABs represent monocultural bilingualism

with predominance of the culture linked to the native language.

Implementing these programs should entail a measured, structured process based on previous research analyzing the potential effects of bilingual education on students' academic performance. As Pavón (2018) notes, some question the benefits of bilingual education from a social perspective, while others point out the lack of sufficient scientific evidence to thoroughly assess the impact of these programs on academic content learning. Agraso-López et al. (2021) emphasize the lack of a generalized consensus needed to establish a clear relationship between bilingual education and academic performance. Nevertheless, they cite studies where the superiority of bilingual students over monolingual is evident.

According to Ardila (2012), individuals who speak two languages exhibit greater metalinguistic awareness, enhanced cognitive control, mental flexibility, better performance on verbal and nonverbal tasks, improved academic development, greater capacity for cognitive resources, better comprehension of the first language, stronger metalinguistic and metacognitive skills and better-controlled processing. Costa (2017) attributes these advantages to increased gray matter density in specific brain regions among bilingual individuals, which fosters the development of certain cognitive abilities.

In this regard, Mohr et al. (2018) discuss brain restructuring resulting from bilingual studies, while Chamorro and Janke (2022) have found that students engaged in bilingual education demonstrate significant improvements in cognitive and social skills, such as selective attention and cooperation. González and Duñabeitia (2024) argue that multilingualism in classrooms is culturally enriching and may enhance overall learning. Thus, there is evidence suggesting that bilingual contexts influence all subjects which makes it meaningful to study further. However, not everything is positive. Potential drawbacks are interlinguistic interference, reduced verbal fluency and delays in language acquisition. It is important to keep in mind that these potential disadvantages of bilingualism may depend on various factors and do not apply universally across all cases (Ardila, 2012; Costa, 2017). Moreover, the cognitive and academic benefits of bilingualism may outweigh these potential drawbacks by positively impacting school performance and cognitive skills development across different areas of knowledge.

However, perceptions regarding bilingual programs remain diverse. Ruiz (2023) highlights that some families believe less content is learned in subjects like History or Natural Sciences compared to non-bilingual schools. Martínez-Garrido et al. (2022) add that some parents perceive these programs as overly focused on vocabulary memorization rather than deep learning. Esparza and Belmonte (2020) note that teachers question the effectiveness of current programs. Martínez and Felices (2022) emphasize students' difficulties in understanding social content taught in English and in incorporating approaches such as addressing controversial topics.

This study aims to test Ardila's (2012) and González and Duñabeitia's (2024) claims regarding improved performance, enhanced academic development, or greater metalinguistic and metacognitive skills among bilingual individuals. Using data collected from various schools in the Autonomous Community of Castilla y León—both non-bilingual schools and those implementing SAB or PEB-BC programs—the study seeks to analyze whether bilingual education contexts significantly influence student performance in both Mathematics and S&T. Additional factors identified by existing literature as influencing academic performance will also be considered for analysis.

Method

This research employs a descriptive, cross-sectional and non-experimental quantitative methodology. It draws upon data collected by the Junta de Castilla y León about the final assessment of sixth grade in EP during 2018/2019 academic year. These data were obtained from the Directorate General of Innovation and Teacher Training of the Junta de Castilla y León upon request. The questionnaires employed (MEFP, 2019) encompassed assessments of linguistic competence in Spanish, Mathematics and S&T.

A two-stage, stratified, cluster sampling was implemented. Initially, schools were selected with a probability proportional to the number of sixth-grade students enrolled. Subsequently, two groups were chosen from each school. Stratification was based on school type (public, private, rural, urban, public and private-subsidized) and the total number of sixth-grade students per

institution. These sampling characteristics, coupled with the extensive information gathered from students, teachers and families, ensure the robustness and reliability of the findings.

Sample

The sample consisted of 1,652 sixth-grade students, including 817 boys and 835 girls from 49 schools—representing 8% of the total sixth-grade student population in Castilla y León for the 2018/19 academic year. Among these students, 548 attended non-bilingual schools, 1,001 were enrolled in SAB and 103 studied in PEB-BC schools. Cognitive tests were administered to these students to assess their levels of linguistic competence (evaluating written expression and oral and written comprehension) mathematical competence, and basic competencies in S&T. This paper focuses exclusively on analyzing mathematical and S&T competencies within a bilingual education context; linguistic competence analysis is reserved for future publications.

Variables

The data provided a significant number of independent variables, many of which align with those identified in the existing literature, while others, gain relevance in light of the specific objectives established for this research (Table I).

TABLE I. Contrast variables of the study.

VARIABLE	TYPE	MEANING	VALUES
Gender	Nominal	Gender	Female, Male
Bilingual education	Nominal	Type of bilingual education in the school	Non-bilingual, SAB, PEB-BC
Setting	Nominal	Type of school by population	Urban, Rural
Type of school by ownership	Nominal	Type of school by ownership	Public, Private-Subsidized
ISEC	Quantitative	Socioeconomic and cultural index (ISEC)	Between -3 and 2

Absences	Nominal	Frequency of unexcused full-day absences from school	1 day/week, 1 day/2 weeks, 1 day/month, never or almost never
Repetition	Nominal	Grade repeated in PE or not	Did not repeated, repeated
Homework	Ordinal	Number of days spent doing homework per week	<=1 day, 2 or 3 days, 4 or 5 days, more than 5 days

Source: Compiled by the author

The dependent variables are as follows (Table II):

TABLE II. Dependent variables of the study.

VARIABLE	TYPE	MEANING	VALUES
Mathematics performance	Quantitative	Numerical score obtained in summative evaluation	Between 119 and 775
S&T performance	Quantitative	Numerical score obtained in summative evaluation	Between 90 and 805

Source: Compiled by the author

Results

Initially, the Kolmogorov-Smirnov statistical analysis with a Lilliefors significance correction (Martínez et al., 2020) was conducted to evaluate whether the samples follow a normal distribution (Table III), which is essential for determining the type of statistical tests to be performed subsequently.

TABLE III. Kolmogorov-Smirnov analysis statistics.

	N	Normal Parameters		Maximum extreme differences			Test statistic	Asymptotic sig (two-tailed) ^a
		Mean	Standard deviation	Absolute	Positive	Negative		
Gender	1,645	1.56	.830	.292	.292	-.248	.292	.000 ^c
Bilingual education	1,659	2.32	2.022	.305	.305	-.300	.305	.000 ^c
Geographic area	1,659	1.33	.471	.428	.428	-.254	.428	.000 ^c
Type of school by ownership	1,659	1.36	.480	.414	.414	-.268	.414	.000 ^c
ISEC	1,659	4.76	.918	.223	.176	-.223	.223	.000 ^c
Repetition	1,636	1.89	.308	.529	.365	-.529	.529	.000 ^c
Absences	1,626	3.85	.503	.515	.386	-.515	.515	.000 ^c
Homework	1,630	3.38	.765	.312	.207	-.312	.312	.000 ^c
Performance in Mathematics	1,644	500.000	100.000	.043	.043	-.041	.043	.000 ^c
Performance in S&T	1,652	500.000	100.000	.059	.053	-.059	.059	.000 ^c

Source: Compiled by the author

Based on these data, we cannot affirm that these variables follow a normal distribution. Consequently, the statistical tests used to evaluate significant differences between variables will be non-parametric (Martínez et al., 2020). To select the specific test, we will consider whether or not there is a relationship between the samples. Thus, for independent samples, following Martínez et al. (2020) we will apply the Kruskal-Wallis test, which serves as a non-parametric alternative to one-way ANOVA when comparing three or more categories. Meanwhile, the Mann-Whitney U test will be appropriate for comparing two categories. These non-parametric tests imply that hypotheses (the null hypothesis, H_0 , assumes that the distribution is identical across the categories of the variable) are based on ranges, medians or data distribution rather than means. However, they exhibit statistical effectiveness equivalent to parametric tests. After hypothesis testing, post hoc tests with Bonferroni correction will be conducted when the H_0 is rejected to determine

which specific categories exhibit differences.

Considering each variable separately, we test whether performance distribution in each subject is consistent across the categories of independent variables (Table IV and Table V).

TABLE IV. Hypothesis testing of performance distribution across the bilingual education categories, gender, geographic area and ownership.

Subject	Performance distribution is equivalent across the following categories							
	Bilingual education		Gender		Geographic area		Type of school by ownership	
	Sig.	Decision	Sig.	Decision	Sig.	Decision	Sig.	Decision
Mathematics	.100 ^a	Fail to reject H_0	.0300 ^b	Reject H_0	.250 ^b	Fail to reject H_0	.014 ^b	Reject H_0
S&T	.635 ^a	Fail to reject H_0	.947 ^b	Fail to reject H_0	.163 ^b	Fail to reject H_0	.326 ^b	Fail to reject H_0

Source: Compiled by the author

^a Kruskal-Wallis test for independent samples

^b Mann-Whitney U test for independent samples

TABLE V. Hypothesis testing of performance distribution across ISEC categories, average absences, repetition and homework.

Subject	Performance distribution is the same between the categories of							
	ISEC		Average absences		Repetition		Homework	
	Sig.	Decision	Sig.	Decision	Sig.	Decision	Sig.	Decision
Mathematics	.000 ^a	Reject H_0	.000 ^a	Reject H_0	.000 ^b	Reject H_0	.003 ^a	Reject H_0
S&T	.000 ^a	Reject H_0	.000 ^a	Reject H_0	.000 ^b	Reject H_0	.000 ^a	Reject H_0

Source: Compiled by the author

^a Kruskal-Wallis test for independent samples

^b Mann-Whitney U test for independent samples.

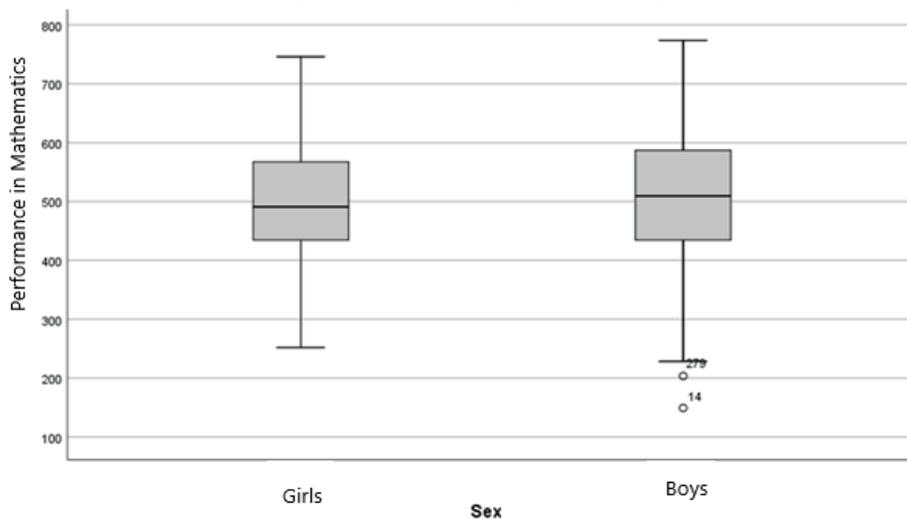
For the variables **bilingual education** and **geographic area**, there is no evidence of performance differences across the respective categories: the three types of bilingual education (Non-bilingual, SAB and PEB-BC) and

the two settings (rural or urban). In contrast, for the variables **Gender** and **Type of school by ownership** differences in Mathematics performance were found. Finally, the variables **ISEC**, **average absences**, **grade repetition** and **homework** show significant differences across their categories in both performances studied.

Although the test conducted to assess the individual effect of bilingual education on performance in different subjects indicated no influence, since other variables do show an impact, we consider conducting tests on smaller samples derived from the groups of values of those variables.

The hypothesis test using the Mann-Whitney U test for the gender variable showed significant differences in Mathematics performance. Figure I shows a better average rank in Mathematics for boys.

FIGURE I. Mathematics performance by gender categories.



Source: Compiled by the author

Examining performance distribution results as a function of the variable bilingual education, the data (Table VI) show differences. For girls, the type of bilingual education does not significantly influence performance in S&T or Mathematics, whereas for boys significant differences are observed in Mathematics performance.

TABLE VI. Hypothesis testing of performance distribution across the gender and bilingual education categories.

	H_0 : Performance distribution among girls is the same across the bilingual education categories.		H_0 : Performance distribution among boys is the same across the bilingual education categories.	
Subject	Sig.	Decision	Sig.	Decision
Mathematics	.564 ^a	Fail to reject H_0	.012 ^a	<u>Reject H_0</u>
S&T	.464 ^a	Fail to reject H_0	.257 ^a	Fail to reject H_0

Source: Compiled by the author

^a Kruskal-Wallis test for independent samples

Post hoc tests show that significant differences are found between boys from non-bilingual schools and boys from SABs (Table VII), with performance being higher in SABs (mean values 513.703 (SD 101.515) and 493.625 (SD 107.926), respectively).

TABLE VII. Post hoc tests for Mathematics performance in boys across bilingual education categories.

Sample 1-Sample 2	Test statistic	Standard error	Standard deviation	Sig.	Sig. Adjusted
Non bilingual-SAB	-46.906	17.929	-2.616	.009	<u>.027</u>
Non bilingual-PEB-BC	65.990	35.894	1.838	.066	.198
SAB-PEB-BC	19.084	37.242	.512	.608	1.000

Source: Compiled by the author

The geographic area variable showed differences only in S&T performance (Table IV) across the different bilingual education categories for rural schools (Table VIII).

TABLE VIII. Hypothesis testing of performance distribution across geographic area and bilingual education categories.

	H ₀ : Performance distribution among urban schools is the same across bilingual education categories.		H ₀ : Performance distribution among rural schools is the same across bilingual education categories.	
Subject	Sig.	Decision	Sig.	Decision
Mathematics	.545 ^a	Fail to reject H ₀	.590 ^a	Fail to reject H ₀
S&T	.618 ^a	Fail to reject H ₀	.003 ^a	Reject H₀

Source: Compiled by the author

^a Kruskal-Wallis test conducted for independent samples

Among rural schools, non-bilingual schools show better performance in S&T while PEB-BC schools exhibit worse performance (Table IX).

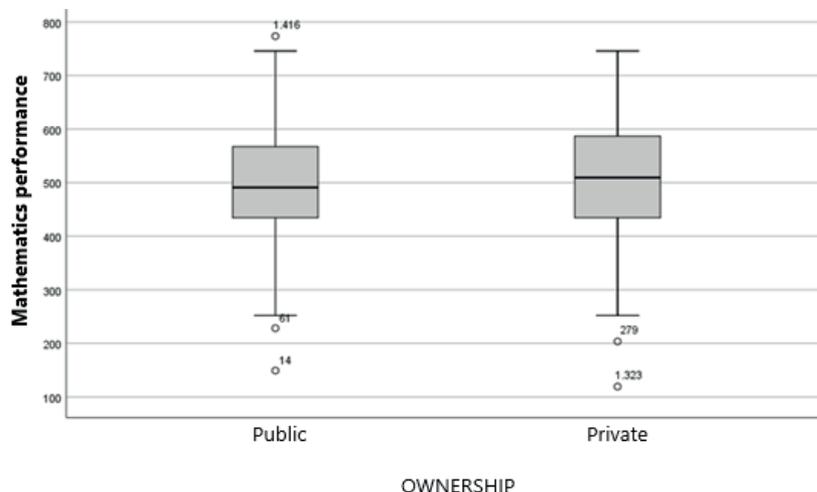
TABLE IX. Average C&T performance in rural schools.

Type of bilingual education	Geographic area: rural	
	Performance in S&T	
	Mean	Standard deviation
Non bilingual	505.970	100.568
SAB	489.984	99.106
PEB-BC	459.227	71.585

Source: Compiled by the author

The ownership variable presents significant differences in Mathematics performance between public and private-subsidized schools (Table IV), with private-subsidized schools showing a better average rank than public schools (Figure II).

FIGURE II. Mathematics performance by ownership categories



Source: Compiled by the author

Since the sample only provides data from public bilingual schools, we can only test the potential influences of the bilingual education variable on performance in each subject for public schools, and comparisons with private-subsidized schools cannot be made. We observe that there is no influence on either of the two studied subjects' performances (Table X).

TABLE X. Hypothesis testing of performance distribution in public schools across bilingual education categories.

H ₀ : Performance distribution among public schools is the same across bilingual education categories.		
Subject	Sig.	Decision
Mathematics	.620 ^a	Fail to reject H ₀
S&T	.315 ^a	Fail to reject H ₀

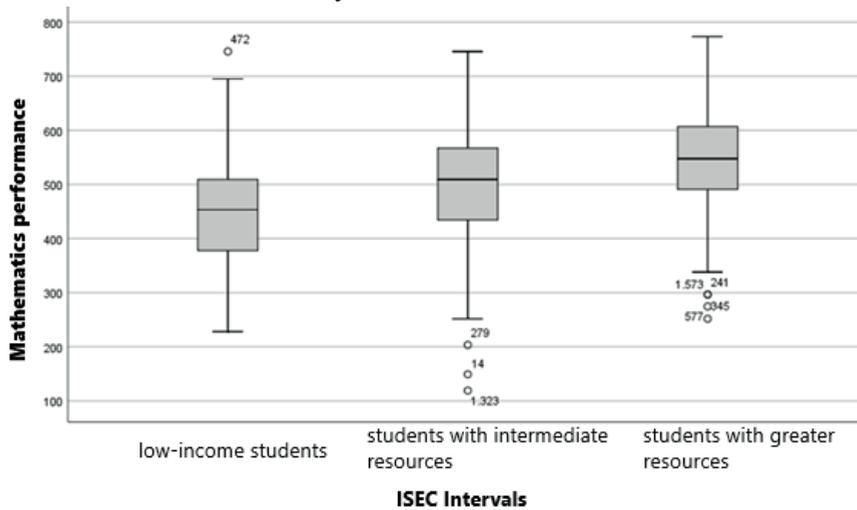
Source: Compiled by the author

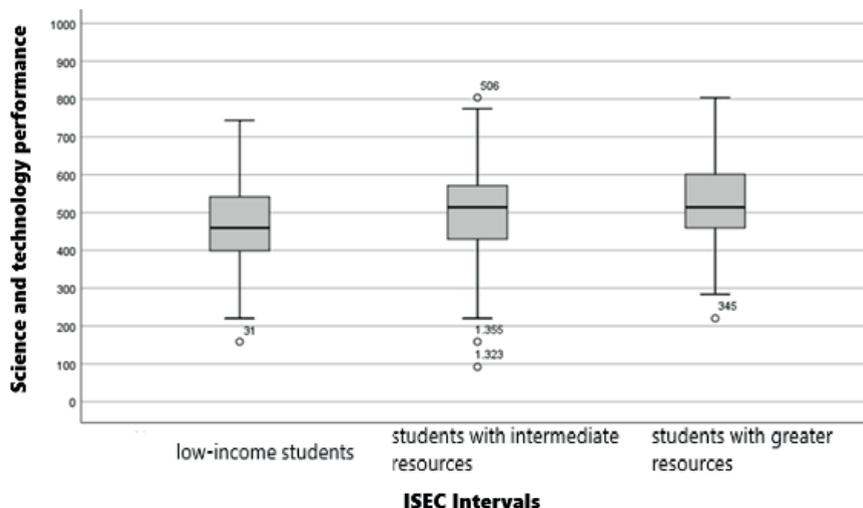
^a Kruskal-Wallis test for independent samples

The next variable studied was ISEC. According to Villar (2018), 20.4% of students in Castilla y León belong to less advantaged families,

20.1% belong to families with greater resources, and 59.5% fall within the remaining group. Using these percentages, we divided ISEC data into three intervals. The tests conducted (Table V) indicated significant differences in all performance measures relative to this variable, with interval 3 (students from families with greater resources) showing the highest performance and interval 1 (students from less advantaged families) showing the lowest performance. Thus, we can conclude that this index influences performance such that the higher the ISEC, the better the student's performance (Figure III).

FIGURE III. Performance by ISEC intervals





Source: Compiled by the author

Observing differences between the groups with different ISEC, we sought to determine if significant differences exist within each group based on whether they attend non-bilingual schools, SAB schools, or PEB-BC schools.

TABLE XI. Hypothesis testing of performance distribution across ISEC and bilingual education categories.

	H_0 : Performance distribution among students with fewer resources is the same across bilingual education categories		H_0 : Performance distribution among students with intermediate resources is the same across bilingual education categories		H_0 : Performance distribution among students with greater resources is the same across bilingual education categories	
Subject	Sig.	Decision	Sig.	Decision	Sig.	Decision
Mathematics	.876 ^a	Fail to reject H_0	.857 ^a	Fail to reject H_0	.014 ^a	Reject H_0
S&T	.466 ^a	Fail to reject H_0	.202 ^a	Fail to reject H_0	.015 ^a	Reject H_0

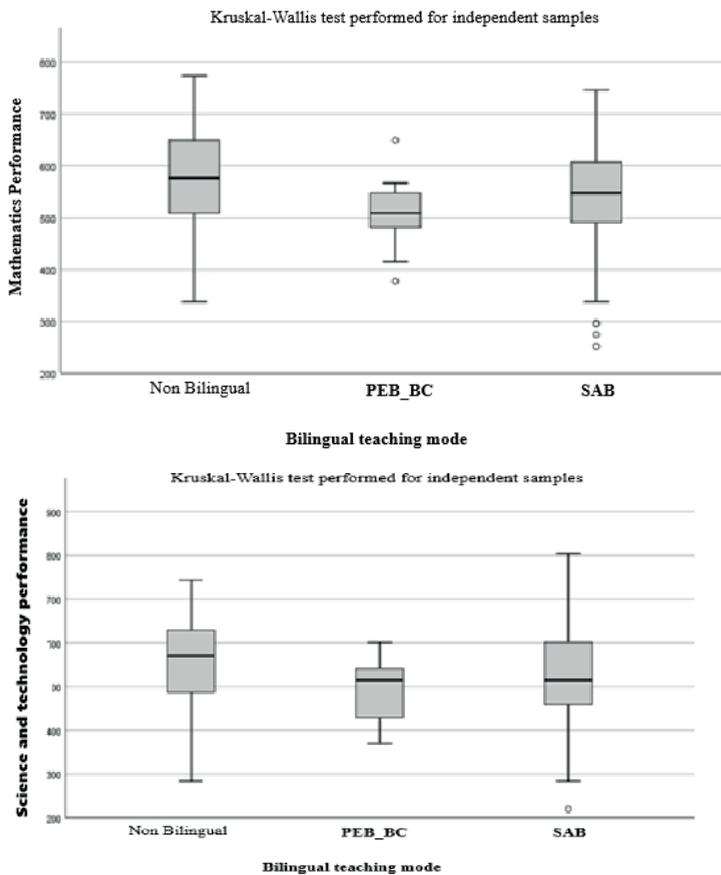
Source: Compiled by the author

^a Kruskal-Wallis test for independent samples

Significant differences based on the type of bilingual education were

found in the group of students with greater resources only. Students from PEB-BC schools achieved lower performance scores in both subjects (Figure IV), while no significant differences were found between SAB schools and PEB-BC schools (Table XII). Non-bilingual schools achieved the best results, with significant differences compared to PEB-BC centers. Meanwhile, for students with fewer resources and those in the “remaining students” interval, no significant differences were found between the different types of schools.

FIGURE IV. Performance among students with greater resources by bilingual education modality.



Source: Compiled by the author

TABLE XII. Pairwise comparisons of bilingual education for students with greater resources.

Math performance	Test statistic	Standard error	Standard test statistic	Sig.	Sig. Adjusted
PEB-BC-SAB	-40.817	25.276	-1.615	.106	.319
PEB-BC-Non bilingual	74.070	28.036	2.642	.008	.025
SAB-Non bilingual	33.253	14.684	2.265	.024	.071
Performance S&T	Test Statistic	Standard error	Standard test statistic	Sig.	Sig. Adjusted
PEB-BC-SAB	-38.058	25.314	-1.503	.133	.398
PEB-BC-Non bilingual	72.260	28.081	2.573	.010	.030
SAB-Non bilingual	34.202	14.703	2.326	.020	.060

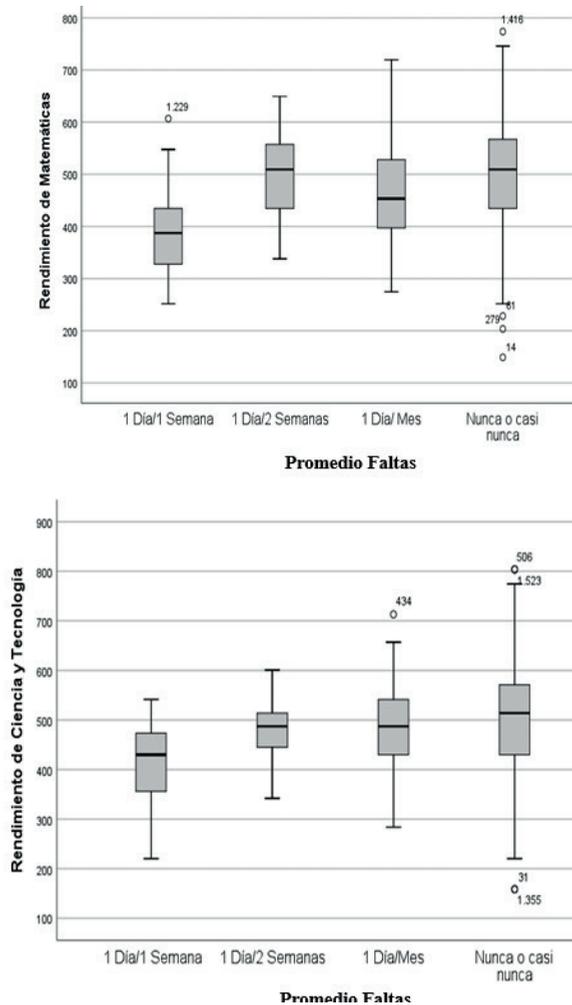
Source: Compiled by the author

Asymptotic significances are displayed (2-tailed tests). The significance level is .050.

a. Significance values have been adjusted by the Bonferroni correction for multiple tests.

The **average absences** variable shows significant differences in performance in the studied subjects depending on the frequency of unjustified absences from class. Figure V shows that students who “Never or almost never” miss class achieve better performance in both subjects, while those who miss class most frequently achieve the worst performance.

FIGURE V. Performance by average absences categories.



Source: Compiled by the author

The hypothesis test based on the bilingual education variable for each group, both for those who rarely or never miss class and for those who frequently miss class, leads to conclusions similar to those reached for this variable without considering this differentiation (Table XIII).

Table XIII. Hypothesis testing of performance distribution across **class absences** and **bilingual education categories**.

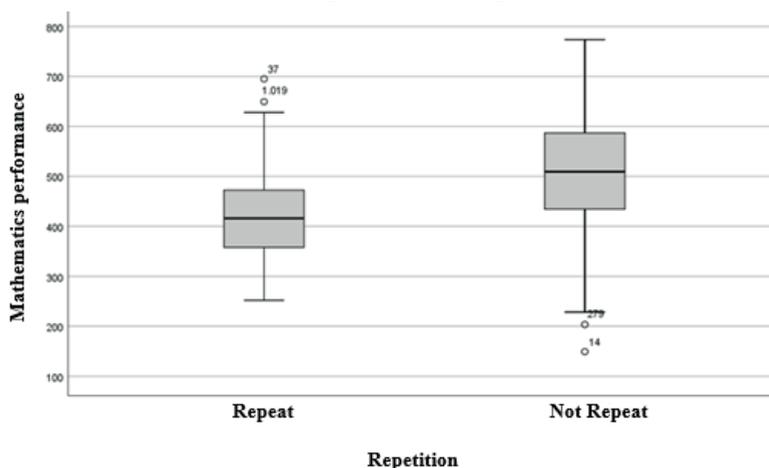
	H ₀ : Performance distribution among those who miss class once a week is the same across bilingual education categories		H ₀ : Performance distribution among those who miss class once every two weeks is the same across bilingual education categories.		H ₀ : Performance distribution among those who miss class once a month is the same across bilingual education categories.		H ₀ : Performance distribution among those who never miss class is the same across bilingual education categories.	
Subject	Sig.	Decision	Sig.	Decision	Sig.	Decision	Sig.	Decision
Mathematics	.428 ^a	Fail to reject H ₀	.427 ^a	Fail to reject H ₀	.221 ^a	Fail to reject H ₀	.134 ^a	Fail to reject H ₀
S&T	.663 ^a	Fail to reject H ₀	.384 ^a	Fail to reject H ₀	.588 ^a	Fail to reject H ₀	.624 ^a	Fail to reject H ₀

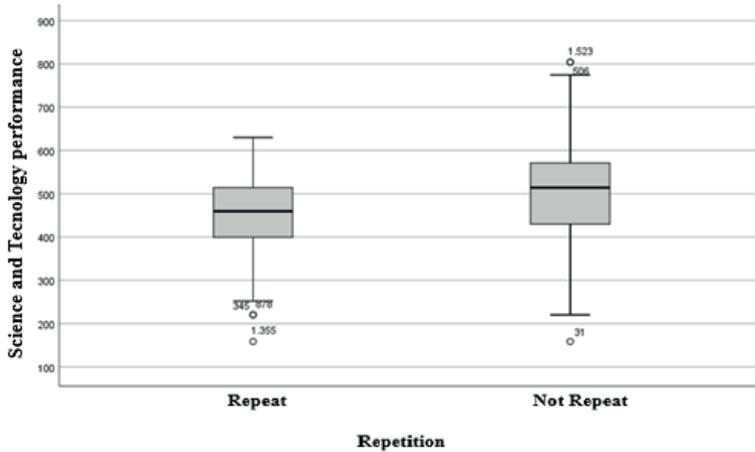
Source: Compiled by the author

^a Kruskal-Wallis test for independent samples

When studying the **repetition** variable, it is observed that repeating a grade influences performance in all subjects. Students who repeat a grade achieve lower performance than those who do not repeat (Figure VI).

FIGURE VI. Performance by **repetition** categories





Source: Compiled by the author

The data also provide more specific insights regarding repetition, such as which grade repetition has an influence on performance. Post hoc tests were conducted to analyze this (Table XIV). It was found that repeating first grade does not influence performance in any subject, although it is true that very few students repeat this grade. For S&T performance, grade repetition in second and fourth grades was found to have an influence on performance.

TABLE XIV. *Post hoc* analysis of different performances for the **repetition** variable

Sample1-Sample2	Mathematics performance			Science and Technology performance		
	Test statistic	Sig	Sig. Ad-justed	Test statistic	Sig.	Sig. Adjusted
1st-Not repeat	60.58	0.825	1.000	144.89	0.543	1.000
1st-2nd	379.98	0.18	1.000	234.19	0.347	1.000
1st-3rd	378.29	0.18	1.000	63.03	0.799	1.000
1st-4th	-289.89	0.31	1.000	-124.74	0.62	1.000
1st-5th	430.83	0.133	1.000	85.50	0.736	1.000
1st-6th	460.83	0.127	1.000	196.14	0.467	1.000
2nd-Not repeat	440.56	0.000	0.000	379.08	0.000	0.000

2nd-3rd	-1.69	0.987	1.000	-171.16	0.088	1.000
2nd-4th	90.08	0.410	1.000	109.46	0.318	1.000
2nd-5th	-50.86	0.654	1.000	148.69	0.191	1.000
2nd-6th	80.86	0.580	1.000	-38.05	0.795	1.000
3 ^o -Not repeat	438.87	0.000	0.000	207.92	0.003	0.080
3rd-4th	88.40	0.408	1.000	-61.70	0.563	1.000
3rd-5th	-52.54	0.635	1.000	-22.47	0.839	1.000
3rd-6th	-82.54	0.547	1.000	-133.11	0.367	1.000
4th-Not repeat	350.47	0.000	0.001	269.63	0.001	0.030
4th-5th	140.94	0.235	1.000	-39.24	0.742	1.000
4th-6th	170.94	0.256	1.000	71.41	0.636	1.000
5th-Not repeat	491.41	0.000	0.000	230.39	0.009	0.241
5th-6th	30.00	0.845	1.000	110.64	0.472	1.000
6th-Not repeat	521.41	0.000	0.001	341.03	0.008	0.212

Source: Compiled by the author

Further analysis in the context of bilingual education for the repetition variable reveals that performance in the studied subjects is not influenced by whether or not they receive bilingual education (Table XV).

TABLE XV. Hypothesis testing of performance distribution across **repetition** and **bilingual education** categories

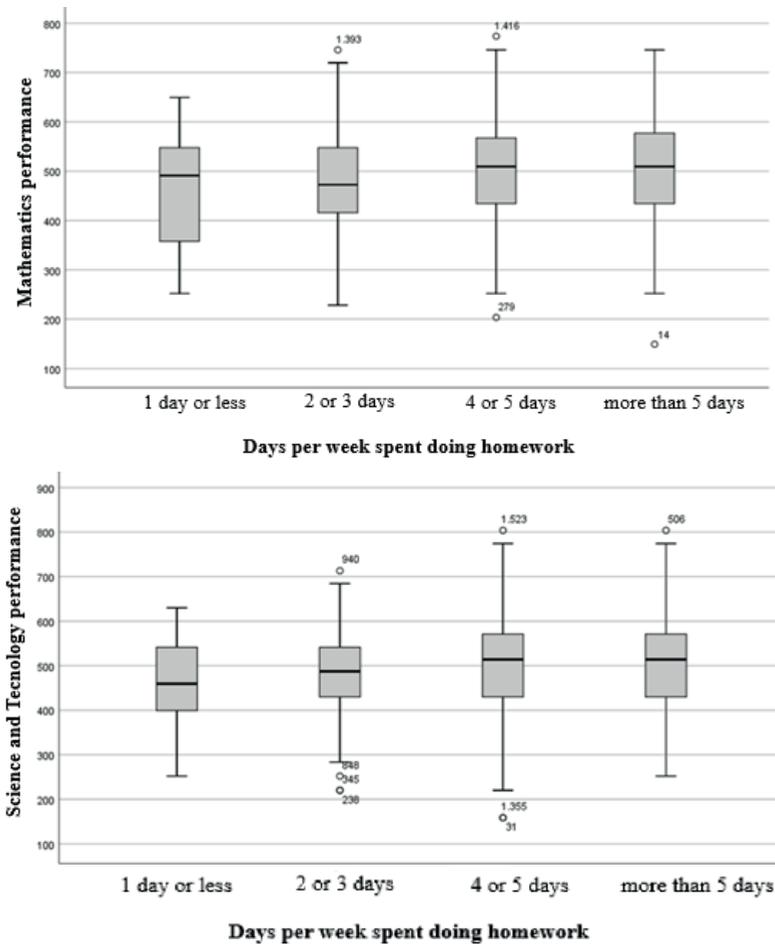
	H ₀ : Performance distribution among non-repeaters is the same across bilingual education categories.		H ₀ : Performance distribution among repeaters is the same across bilingual education categories.	
Subject	Sig.	Decision	Sig.	Decision
Mathematics	.360 ^a	Fail to reject H ₀	.789 ^a	Fail to reject H ₀
S&T	.312 ^a	Fail to reject H ₀	.464 ^a	Fail to reject H ₀

Source: Compiled by the author

^a Kruskal-Wallis test for independent samples

Finally, the homework variable indicates that dedicating more or less time to homework influences performance in the studied subjects (Table V). Students achieve better performance as they dedicate more days to completing homework (Figure VII).

FIGURE VII. Performance by homework categories



Source: Compiled by the author

For groups of students dedicating different numbers of days to homework, the bilingual education variable influences S&T performance among those who dedicate 2 or 3 days to homework (Table XVI).

TABLE XVI. Hypotheses testing of performance distribution across **homework** and **bilingual education** categories.

	H ₀ : Performance distribution among those who dedicate 1 day to homework is the same across bilingual education categories		H ₀ : Performance distribution among those who dedicate 2 or 3 days to homework is the same across bilingual education categories		H ₀ : Performance distribution among those who dedicate 4 or 5 days to homework is the same across bilingual education categories		H ₀ : Performance distribution among those who dedicate more than 5 days to homework is the same across bilingual education categories	
Subject	Sig.	Decision	Sig.	Decision	Sig.	Decision	Sig.	Decision
Mathematics	.702 ^a	Fail to reject H ₀	.244 ^a	Fail to reject H ₀	.365 ^a	Fail to reject H ₀	.336 ^a	Fail to reject H ₀
S&T	.515 ^a	Fail to reject H ₀	.017 ^a	Reject H₀	.842 ^a	Fail to reject H ₀	.340 ^a	Fail to reject H ₀

Source: Compiled by the author

^a Kruskal-Wallis test performed for independent samples

After conducting post hoc tests (Table XVII), significant differences were only observed in the following cases: for S&T, the highest performance was observed in PEB-BC schools (Mean = 534.468, SD = 64.989) and the lowest performance in SABs (Mean = 461.523, SD = 99.578).

TABLE XVII. Post hoc tests for homework by bilingual education **categories**.

	S&T performance among those who dedicate 2 or 3 days to homework				
Sample 1-Sample 2	Test. statistic	Standard. error	Standard test statistic	Sig.	Sig. Adjusted
PEB-BC-Non bilingual	-30.316	11.984	-2.53	.011	.034
PEB_BC-SAB	32.741	11.445	2.837	.005	.014
Non bilingual-SAB	2.155	7.195	.299	.765	1.000

Source: Compiled by the author

Discussion

The results of this study initially suggest that the context of bilingual education does not significantly influence academic performance in non-linguistic subjects always taught in Spanish, such as Mathematics, or in non-linguistic subjects like S&T, which are taught in English or Spanish, depending on the type of school. No differences were found between non-bilingual, SAB schools or PEB-BC schools.

A more detailed analysis, resulting from the consideration of other factors, reveals differences in Mathematics performance related to gender across schools with different bilingual education modalities. This research confirms that boys from SAB schools excel in Mathematics compared to boys from non-bilingual schools and girls. This finding aligns with the studies of Echavarri et al. (2007) and Pozo-Burgos et al. (2022) which indicate that men and women employ different strategies to solve complex problems. Men tend to use spatial and abstract reasoning, while women rely on verbal strategies.

Better performance in Mathematics in bilingual schools, where it is never taught in English, may be justified by the reasons argued by Ardila (2012): greater cognitive control, mental plasticity, better results in non-verbal tasks, greater academic achievement or a superior development of mental resources.

Regarding S&T performance which is not taught in English in non-bilingual schools but is predominantly taught in English in SABs (Vega-Agapito et al., 2021) and entirely taught in English in PEB-BC schools, (Falcón-Díaz et al., 2019), the results did not show significant differences between the types of bilingual education (SAB, PEB-BC, non-bilingual), This suggests that bilingual education, at least in the context of this study, does not significantly affect performance in this area. The lack of differences in S&T performance could be related to the fact that this area typically involves both logical reasoning and the use of technical vocabulary, which may not be significantly affected by the linguistic context, especially in partial bilingual programs where the language of instruction for science may vary. This is particularly true for SABs, where science may be taught in either English or Spanish (Vega-Agapito et al., 2021).

Other factors do emerge as influential on S&T performance. As noted by Pozo-Burgos et al. (2022), differences were found related to socioeconomic environments. According to these authors, a high socioeconomic environment supports superior performance in areas like science. Regular attendance at school is also positively related to performance in S&T since, as Ndjangala et al. (2021) highlight, missing class prevents students from keeping up with content and benefiting from practical explanations often required for these subjects. Additionally, students who repeat grades tend to show lower performance in S&T, possibly due to difficulties in acquiring basic skills at earlier stages, which impacts their ability to follow advanced scientific content .

Another factor—the time dedicated to completing homework—shows a direct relationship with S&T performance: students who practice and review concepts at home consolidate their learning more effectively. This relationship between homework dedication and performance is consistent with the theory that constant reinforcement of concepts allows students to integrate scientific knowledge more effectively (Willms, 2010).

Overall, we found that absenteeism has a negative impact on academic performance, especially when students frequently miss classes. Similar to Custodio et al. (2022) frequent absences is a significant negative influence on academic performance for those with high levels of absenteeism, disconnecting them from the school environment and the role of teachers. This finding underscores the need for interventions aimed at reducing absenteeism to improve educational outcomes.

Finally, the study shows that students who dedicate more time to homework tend to achieve better results across all subjects. This finding emphasizes the importance of study habits and time management for academic success and suggests that both parents and teachers should encourage consistent study routines. Murillo and Martínez-Garrido (2013) found that among third-grade primary students from nine Latin American countries, their academic performance improved when homework was assigned for completion at home, and subsequently reviewed in class; however, neither the time spent on homework nor its frequency or type were as relevant as its review process.

These results contrast with findings for China by Zhibin (2024) who showed that students in bilingual programs significantly outperformed their

peers in monolingual programs with substantial academic gains. This aligns with the studies by Chamorro and Janke (2022) conducted in Spain. Similarly, studies by Tennakoon (2024) for Sri Lanka report cognitive benefits and enriched learning for bilingual programs, but note dependencies on factors such as teacher quality, curriculum design and socio-economic conditions.

Conclusions

While it initially appears that a bilingual education context does not significantly influence performance in S&T, even though it is predominantly taught in English, it may have an impact on areas that are not taught in English, such as Mathematics. Instruction in a second language could add a cognitive load that affects performance in analytical areas, suggesting the need for differentiated approaches based on gender. This includes encouraging the development of analytical skills among girls and the strengthening linguistic skills among boys.

This study is based on a sample of schools in Castilla y León, which limits the generalization of the findings to other educational contexts with different policies and resources. In Spain, there are several bilingual autonomous communities with two co-official languages, so in them, the educational context would be trilingual rather than bilingual. This scenario was not considered in our research, conducted in a monolingual community; therefore, we cannot extend the validity of our results to those regions. Future studies should expand the sample to include data from other autonomous communities, both monolingual and those with a second co-official language. Additionally, the cross-sectional nature of the study does not allow for an analysis of changes over time. Longitudinal studies in the future would help to better understand the long-term impact of bilingual education on academic performance by evaluating students over several years.

Another limitation was the reliance on performance data based on standardized tests, which may not fully capture all dimensions of learning. Further work could provide interesting insights by using an ad hoc, non-standardized questionnaire that evaluates all dimensions. It would be also valuable to incorporate classroom observation methods to

analyze how bilingual interactions affect learning in real time. Furthermore, studying the role of additional variables, such as students' self-concept and motivation, could offer a more comprehensive view of the factors influencing performance in schools with bilingual education programs.

Finally, expanding the study to include teachers by conducting a competency evaluation of teachers in bilingual schools and recording their perception of bilingual programs would provide further insights.

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Reviews

Reviews

Moraleda Ruano, A., & Galán Casado, D. (2024, Coord.). Stigma and Education. An Approach to Equality. Narcea. 177 pp. ISBN. 978-84-277-3186-8

When a preface begins by placing the reader before themselves, it opens a path of encounters from the uniqueness of each person. This is how this paperback book from Narcea Publishing starts: “sometimes it is necessary to look back and face what your life has been up to that moment. Take a deep breath and take an honest look at who you are today and, of course, the bricks you have been building for that construction” (p. 7). Ten chapters to address stigma from different perspectives. A stigma that we have all known or experienced throughout our own history.

Conversely, being older, mental health, disability, multiculturalism, or gender are the topics that bring us closer to ideas not so far from our reality, even when we thought we were not the target, or when we were “often silent witnesses to experiences in which prejudice and judgments relegated someone close to us, people who walk beside us, also building their lives as best they can” (p. 8).

Stigma arises from our own citizen condition, a mark that in other times was branded on the skin to be seen and today is labelled with social approval in an invisible way, with a hostile and distrustful attitude, affecting the people who live with it negatively. For this reason, “people belonging to a marginalised group are labelled by others as abnormal, shameful, or undesirable” (p. 13).

Chapter 1 presents the current theoretical frameworks of reference, from the origin, components, types, and actions that lead to stigmatising a person or group, as well as their consequences. But how can we address this stigma through education? Chapter 2 focuses on this core binomial that gives the book its title: stigma+education.

The role of education as prevention is evident, and we all know “people

who have overcome great life difficulties thanks to the institutional and personal support received” (p. 30). UDL, institutional resource bank, diversified methodologies, a new evaluation model, or an open curricular design can be political measures that can prevent stigma.

The third chapter introduces us to the socio-educational challenges of drug addiction, from research that analyses the perception of university students in the socio-educational field in relation to their intervention with drug-dependent people. Attributing it to a personal choice can be the seed of the stereotype and stigma towards people who suffer from it, something that, according to the authors’ approach, can be avoided “by combining theoretical, methodological, and practical learning from different levels of prevention and diversity of approaches” (p. 52).

The fourth chapter begins with a clarification of key terms in the field of sexual education (sex, gender, sexual identity, orientation, diversity) that need to be defined to understand how stigma in this area “originates when individuals deviate from the established social norms regarding gender identity and sexual orientation” (p. 62). The school can be the favourable environment to “offer comprehensive and systematic sexual education” (p. 67) and thus support the formation of positive attitudes to accept people’s sexual differences.

A work focused on stigma cannot avoid including the multicultural perspective in education, because the usual starting point of this perspective is already impregnated with a negative view of diversity, because it pairs diverse with different, and therefore, with the need for specialised attention for difficulty. But aren’t we all different? Don’t we each embody diversity as a form of wealth? This multicultural diversity, which is the focus of the fifth chapter, must thus be understood as fundamental for the migrant, but also for the society that welcomes and constitutes itself as a multicultural community.

Chapter 6 shows us how the generalised need to use technology in all areas of life is not without problems, because its use has become a constant need to the detriment of the rest of the environment for some people. Cyberbullying, grooming, sexting, or techno-addiction are some of the terms linked to dangers that have arisen with the use of the internet. The chapter presents an

experimental study with a university population focused on problematic use of networks and the support received through social networks.

Disability from the stigma perspective is the central theme of the seventh chapter, which focuses on a review of the research. Three social processes link stigma and disability: individual discrimination, structural discrimination, and self-stigma. Knowing or making disability visible can lead to less stigmatising attitudes. Harassment, social marginalisation, compassion, or infantilisation are terms linked to stigma from disability, which can lead to a decrease in quality of life and social participation.

The title of the eighth chapter brings us closer to dialogic practices in this case for working with adolescents and mental health problems. Almost half of mental disorders begin before the age of 18, so it is essential “to carry out preventive work in educational centres, with a process that encompasses aspects related to emotional development, awareness of the stigma of mental health problems, and learning coping strategies and establishing support networks to mitigate these difficulties” (p. 130).

The social reintegration of people who have been in prison as a distance from a situation of stigma is the theme of the ninth chapter. This stigma, far from being a consequence for people who have been imprisoned upon regaining freedom, takes place from the entry into the penitentiary context, when the person must “adapt to the customs that the institution itself imposes” (p. 144). Penal stigma is not shown in isolation but infers with characteristics of each person’s reality: illnesses, self-esteem, drugs, or homophobia, among others. A stigma that does not remain stagnant in the person in prison but affects their closest nucleus, the family.

And the work ends by looking at stigma from ageism, “a set of negative stereotypes and prejudices associated with older people and the ageing process” (p. 161). A negative view of ageing can lead to attitudes of rejection, which sooner or later will affect us all.

Blanca Arteaga Martínez

Caride, J. A. and Rodríguez, J. (Coords.) (2024, Nov.). Realities and Horizons of Education in Galicia. Pontevedra, Kalandraka Editora. ISBN: 978-84-1343-325-7.

This publication is a tribute to the USC professor and pedagogue Antón Costa Rico, an outstanding member of the Research Group on Social Pedagogy and Environmental Education (SEPA-interea), a ‘rigorous and exemplary’ intellectual and scientific reference, essential to understand the educational system in Galicia.

It includes 22 original texts written by 56 authors, most of them co-authors, specialists in the subject they write about, with different profiles and backgrounds in the professional and research fields, coordinated by doctors José Antonio Caride and Jesús Rodríguez. It is organised into three sections: the educational past and its relationship with the present, future challenges and new perspectives on education in Galicia, a context from which the major problems and trends facing education systems today are considered, in a continuous flow between the local and the universal.

The book shows the evolution of Galician schools, from the beginning of the last century to the present; the slow process of dignifying the teaching profession and improving the conditions of rural areas, public schools and, in particular, female teachers, until the first third of the 20th century, with the advent of the 2nd Republic, which promoted the schooling of the working classes through literacy campaigns, teacher training and cultural extension, pillars of contemporary education.

The historical chronicle shows how a rural education system, closed and in precarious conditions, was changing, despite the dictatorship, until it became a system open to the Galician language and culture, bringing them out of their subjugation, through a process of reconstruction of the democratic and cultural identity where social agents at all levels played an essential role in a transition, always imperfect, towards fairer forms of human life.

In this journey, educational renewal and social transformation go hand

in hand, highlighting different pedagogical collectives, such as the *Movimiento Nova Escola Galega*, chaired by Antón Costa, and, in general, teaching associations, together with other collective actors and publishing houses that promoted teaching in Galician and its dissemination in children's and young people's literature.

They highlight the relationship between Education, Culture and Heritage, historical, natural and especially linguistic, as a basis for the construction not only of an identity discourse but also of cultural diversity and global citizenship, questioning the intrinsic goodness of cultural heritage or of education itself if they hide fractures in social equality.

While sharing a general evolution of educational and social progress, the authors do not avoid mentioning dangers and possible setbacks. Neoliberalism, climate change, the degradation of the welfare state, linguistic standardisation, 'digital disruption' and social exclusion threaten democracy in a globalised society. Accepting their challenges, they propose practices of 'democratic resistance', such as eco-citizenship, cyberactivism, post-digital literacy or democratic education; without forgetting necessary frames of reference, such as children's rights, inclusion, gender perspective, co-education, ecology or the culture of peace.

As proof that towns and education systems can change for the better, the book brings together unique initiatives and hopeful educational experiences, from the territory, aimed at breaking with a model of Special Educational Needs based on the individual deficit paradigm; at promoting the emotional well-being of students; at creating healthy and inclusive schools; at designing educating cities and towns... The rural environment is the main setting for these creative responses, such as the pioneering *Preescolar na Casa*, the *Casas Niño*, the *Centros Rurales Agrupados*, the *Centros Públicos Integrados* or the adaptation of Professional Training.

The book goes beyond the school to go into communities, local administration, the collective construction of education, intergenerational dialogue... where school education is, above all, a social education, with educational research at the service of teacher transfer and critical pedagogy: a

social and political project valued by all, not just teachers or families, for the construction of the society we want.

When we are witnessing the demolition of social rights and of human coexistence itself, education remains a fertile field in which to cultivate hope. Behind the recognition of Professor Antón Costa, ‘a militant example of coherence’, the reflection and rigour in the treatment of the issues convey an encouraging message: the leading role that education can play in the improvement and emancipation of a society based on collective awareness and action.

José Luis San Fabián Maroto

Ripoll, O., & Pujolà, J.-T. (2024). Gamification in higher education: theory, practice and didactic experiences. Ediciones Octaedro. 170 pp. ISBN: 978-84-10054-73-8

The book “Gamification in higher education: theory, practice and didactic experiences” is an essential resource for university teachers interested in exploring the use of gamification as a pedagogical strategy in the context of higher education. It is structured in two parts and combines a solid theoretical basis with practical examples and real experiences, thus providing an integral view on the educational potential of gamification and its implementation in higher education.

The authors are Oriol Ripoll and Joan-Tomàs Pujolà. Oriol Ripoll is professor of game creation at the ENTI-Universitat de Barcelona, and gamification at the CAFE degree at EUSES, at the University of Girona. Joan-Tomàs Pujolà is the principal investigator of the realTIC research group and has led research projects on the use of gamification with technology in language teaching.

Both propose an innovative idea by gamifying the reading of the book, inviting the reader to choose how to interact with the content in a playful way. This approach not only reinforces the central proposal of the book, but also serves as a practical example of how gamification can be applied in education.

The first part of the book, entitled “theory and practice,” focuses on providing the theoretical foundations of gamification and a practical approach to its successful implementation in education. In this section, several experts in the field address various aspects of educational gamification.

The initial chapter, written by Joan-Tomàs Pujolà, sets out a definition of gamification, presenting it as a didactic strategy that can be used to improve the teaching and learning process. This chapter serves as an introduction to the following, providing a conceptual framework that allows the reader to understand the key principles of gamification.

In the following chapters, the authors explore different fundamental elements of gamification. Ruth Contreras-Espinosa and José Luis Eguia, in chapter 2, analyse the game elements and propose a taxonomy agreed by national and international experts, which will serve as a tool for the design of educational proposals. This taxonomy facilitates understanding of the essential components that must be incorporated into a gamified experience, such as competence, cooperation, awards and rewards.

One of the most prominent chapters is the third, written by Oriol Ripoll, who delves into narrative analysis, a key element in giving coherence and structure to game elements in any gamification process.

Pere Cornellà, in chapter 4, discusses the role of technology in the implementation of gamification. Examines how digital tools can facilitate the creation of gamified learning experiences and provides practical examples of platforms and resources that can be used by teachers. This approach is interesting because in today’s educational context technology plays a crucial role in creating innovative learning experiences.

Finally, chapter 5, written by Anna Castells, offers practical advice and reflections on how to plan a meaningful gamification proposal in univer-

sity classrooms.

The second part of the book provides a collection of seven educational experiences of gamification implemented in various Spanish universities. These experiences show how theoretical concepts can be applied in real teaching situations. Each experience is presented in a uniform format, describing the context, objectives, narrative used, built-in game elements, digital tools employed and the implementation and evaluation procedure.

Experiences cover a wide variety of approaches and disciplines. For example, teacher Esther Edo-Agustín presents an experience of structural gamification in the Primary Education Degree, using game elements such as points, emblems and badges to motivate students.

In short, “Gamification in higher education” is a fundamental book for any university teacher interested in exploring the potential of gamification. Its combination of a solid theoretical foundation and practical examples provides a comprehensive guide to implement this pedagogical strategy effectively, promoting more dynamic, interactive and meaningful learning.

Isabel Cerezo Cortijo

Flores-Alarcia, Ò., y Fornons Casol, L.. (2024). Education and Artificial Intelligence: Horizons of transformation. Madrid: Dykinson. 144 pp. ISBN: 978-84-1070-877-8

The book presented is a monograph that arises at a crucial moment in which artificial intelligence (AI) has gone from being an emerging technology to becoming a central element in the transformation of our society, especially in the field of education. AI has the potential to revolutionize teaching and learning processes, offering tools that can personalize education, optimize knowledge management, and facilitate access to quality educational resources. However, this transformation is not without its challenges and critical questions.

The need for this book lies in the urgency of addressing the implications of AI in education holistically. As machines become more capable of analyzing data and learning from it, it is critical to reflect on the role of educators in this new context. How can teachers adapt to an environment where AI plays such a significant role? What are the risks associated with the misuse of these technologies? And, perhaps most importantly, how can we prepare future generations to live with AI ethically and critically?

This monograph is not only limited to exploring the practical applications of AI in the classroom but also delves into philosophical and ethical questions that are essential to understanding its impact. Through a multidisciplinary approach, topics ranging from the ability of machines to think to the need for appropriate regulatory regulation are addressed. In addition, the implications for teacher training and the development of healthy educational organizations are examined.

The importance of this book in education is undeniable. It provides a platform for educators, researchers and education policymakers to reflect on the future of teaching in a world increasingly influenced by technology. By bringing together the voices of specialists in various areas, the monograph provides a comprehensive vision that not only analyses the present but also invites us to imagine possible futures where education and technology co-exist harmoniously and beneficially for all. In short, it is a valuable resource for understanding and navigating the complexity of the impact of artificial intelligence on education, and its relevance will only continue to grow in the years to come.

This work is structured in nine chapters that are organized as follows: (i) Can machines think? (ii) Educating for Artificial Intelligence: An Approach in Perspective; (iii) Artificial intelligence in the healthy development of educational organizations; (iv) Generative artificial intelligence in the classroom: Skills, strategies and content to learn and teach in a new paradigm; (v) Use and application of the IAG for the evaluation processes; (vi) The regulation of the IAG in the field of teaching; (vii) Emergence of AI in Higher Education and (viii) Artificial intelligence and teacher training.

The book presents proposals and evidence to improve the organization by attending to the new reality with AI, from change processes to evaluation in educational organizations. For this reason, it has a reflective and applicative character. It establishes a synthesis of the main research related to functional orientations of the processes that involve AI, as well as the learning and experiences that the authors themselves have adopted throughout their careers. In conclusion, it is a work of a reflective, applicative and current nature in the dynamic liquid, social and educational context.

The book is of great prestige, considering two areas: editorial quality and authors. Editorial Dykinson, S. L. is positioned in fourth position in Education. It is also worth taking into consideration the nature of the authors of the work, since they stand out both nationally and internationally. In this book we can find authors such as Francisco Bellas (professor at the Universidade da Coruña), Isabel del Arco and Ramon Béjar (both full professors at the University of Lleida), Miquel Àngel Prats (professor at Blanquerna – Universitat Ramon Llull) or Jorge Balladares Burgos (professor at the Andina Simón Bolívar, Ecuador).

Dra. Anabel Ramos-Pla

Santos Rego, M.A., Lorenzo Moledo, M., & Sáez Gambín, D. (2025). The University and Service-Learning. What matters is quality. Editorial Narcea

The book *The University and Service-Learning. What matters is quality.*, by Miguel A. Santos Rego, María del Mar Lorenzo Moledo, and Daniel Sáez Gambín, published by Narcea Ediciones in 2025, provides a rigorous analysis of the implementation of Service-Learning (ApS) in higher education. The work focuses on the necessity of ensuring quality in ApS projects, offering theoretical and methodological tools for their proper planning, execution, and

evaluation. Through a solid academic approach, the authors argue that the success of ApS in universities depends not only on its expansion but also on its effective integration into the curriculum and its ability to generate significant educational and social impacts.

Service-Learning has become established as a pedagogical strategy that combines academic training with social engagement, allowing students to develop both disciplinary and transversal competencies while collaborating with their communities. However, the mere implementation of this methodology does not guarantee its effectiveness. According to the authors, the key lies in designing ApS experiences that meet well-defined quality criteria and contribute both to student learning and community well-being. This approach is reflected in the book through a detailed analysis of the principles of ApS, the identification of best practices, and the formulation of indicators for its evaluation.

One of the main contributions of this work is the identification of the elements that determine the quality of ApS projects. Based on a solid conceptual framework, the authors establish criteria to assess the impact of ApS on three levels: student learning, community benefits, and institutional transformation within the university. In this regard, they highlight the importance of structured pedagogical design, effective linkage with social needs, and an evaluation system that allows for measuring results and fostering continuous improvement.

The book also stands out for its empirical approach, as it includes an analysis of concrete ApS experiences in various universities. These case studies illustrate the application of theoretical principles in different institutional and disciplinary contexts, offering examples of best practices and highlighting the most common challenges in implementing this methodology. Furthermore, the authors emphasize the need for ApS to be part of universities' institutional strategies rather than being limited to isolated initiatives by individual faculty members or student groups.

Another key aspect addressed in the book is the evaluation of the impact of Service-Learning. The authors stress the importance of methodological tools that objectively measure both the learning acquired by students and

the effects on the community and the university itself. This perspective helps consolidate ApS as a rigorous academic practice based on evidence, distinguishing it from other forms of volunteering or community engagement that lack a structured pedagogical approach.

From an academic standpoint, this work serves as a reference text for faculty, researchers, and university administrators interested in educational innovation and the social responsibility of higher education institutions. Its emphasis on quality and evaluation makes it an essential resource for those seeking not only to implement ApS in their institutions but to do so with rigor and effectiveness.

Ultimately, this book represents a fundamental contribution to the study of Service-Learning in higher education. By combining a robust theoretical foundation with case studies and evaluation tools, the authors provide a clear and well-supported guide for improving the quality of this methodology. The work underscores the importance of structuring ApS as a sustainable academic practice over time, ensuring that its impact extends beyond the classroom and effectively contributes both to student education and to strengthening universities' social commitment.

Alexandre Sotelino Losada

Repetition and school dropout.

Policies for the frontiers of education systems

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Secondary School Dropout in Paraguay: A Big Data Analysis.



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