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Schools being transformed: quantitative study about Innovative Learning Environments

Escuelas en transformación: estudio cuantitativo sobre Entornos Innovadores de Aprendizaje

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Resumen

Las escuelas atraviesan procesos de transformación constante para adaptarse a las necesidades de la sociedad. La difusión de los Entornos Innovadores de Aprendizaje (EIA) ha promovido transformaciones en términos de metodologías implementadas, espacios diseñados y recursos utilizados, entre ellos la tecnología digital. Este estudio analiza el proceso de transformación emprendido por 46 escuelas en el marco de los EIA, con el fin de identificar patrones comunes, explorando las percepciones del profesorado, describiendo los procesos seguidos y destacando los factores clave que influyen en su implementación. Se validó un cuestionario creado *ad hoc* que recogió información sobre la percepción del impacto, las estrategias aplicadas y las prácticas de evaluación. Se desarrolla un análisis de datos de tipo descriptivo exploratorio no experimental, utilizando el programa SPSS. El estudio subraya la importancia de la planificación estratégica, el desarrollo profesional, el liderazgo y las reflexiones colaborativas para fomentar transformaciones educativas exitosas alineadas con los EIA. Se observa una fuerte relación entre diversas estrategias y una mejora en diferentes cuestiones del centro y del alumnado. Estos hallazgos brindan valiosos datos, ya que ofrecen orientaciones concretas sobre cómo diseñar un proceso de transformación, indicando estrategias organizativas o formativas que han resultado exitosas en los casos estudiados.

Palabras clave: *educación infantil y primaria; transformación educativa; estrategias organizativas; innovación educativa; entornos innovadores de aprendizaje.*

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Abstract

Schools undergo constant transformative processes to adapt themselves to the evolving needs of society. The spread of Innovative Learning Environments (ILEs) has driven transformations in terms of teaching methodologies, spatial design, and the use of resources, including digital technologies. This study examines the transformation process undertaken by 46 schools within the framework of ILEs, aiming to identify common patterns by exploring teachers' perceptions, describing the processes followed, and highlighting key factors influencing their implementation. An *ad hoc* questionnaire was designed and validated, to collect information on perceived impact, applied strategies, and evaluation practices. A non-experimental exploratory descriptive data analysis was conducted using SPSS. The study highlights the importance of strategic planning, professional development, leadership and collaborative reflection in fostering successful educational transformations aligned with ILEs. Findings show a strong relationship between various strategies and improvements in both school functioning and student outcomes. These findings provide valuable insights, offering concrete guidance on how to design transformation processes, including organizational and training strategies that proved effective in the schools studied.

Keywords: *Early childhood and Primary Education; educational transformation; organizational strategies; educational innovation; innovative learning environment.*

Introduction

Since 2012, the creation of Innovative Learning Environments (ILE) has been promoted internationally. Despite growing interest and policy support, teachers often express uncertainty about how to design and implement them effectively. Research has primarily focused on ILEs outcomes rather than the processes leading to their successful development, even though thoughtful design and execution are crucial to their success.

For instance, Beery *et al*. (2013) and French *et al*. (2022) found that without aligned teacher training, pedagogical change fails to materialize. This highlights the practical value of identifying common elements of school transformation to guide other schools in initiating their own processes.

This study addresses this gap by exploring the transformation process itself. Specifically, the research question is: "What are teachers' perceptions of the school transformation process toward ILEs, and what factors facilitate, shape, or hinder these processes across different educational contexts?".

Addressing these questions serves a dual purpose: meeting the needs of educators navigating transformation and contributing to a still-developing body of literature. The goals pursued three goals: (1) to analyze teachers' perceptions of the impact of the transformation on different aspects of school life; (2) to describe the processes followed by schools implementing ILEs; and (3) to identify key elements that facilitate, condition, or hinder this transformation.

To this end, teachers actively involved in these transformations were consulted. The analysis seeks to support and guide schools embarking on educational change by highlighting the factors that support or hinder such processes.

In line with these objectives, this study contributes to the ILE literature in three ways. First, it offers a large-scale, empirically grounded account of teachers' voices, perspectives often underrepresented in a field focused on architectural features or institutional visions. Second, it provides a comparative analysis of transformation processes across multiple schools, moving beyond the single-case studies commonly found in earlier research. Third, it identifies common factors shaping these processes and synthesizes them into a practical framework for school leaders and policymakers.

To contextualize the study, it is important to define ILEs. According to the Organisation for Economic Co-operation and Development (OECD) (2013, p. 11), a learning environment is the context in which "learning takes place within the school setting, including but not limited to the social, cultural, temporal, aesthetic and virtual elements as well as the physical aspects of the environment". Building on this, contemporary research defines ILEs as environments that combine innovative physical design and innovative pedagogies (Mahat *et al*., 2018; Mahat & Imms, 2021). These highly flexible spaces feature intentioned furniture, ubiquitous technology, openness, and high connectivity, used facilitating student-centred learning experiences (Blannin *et al*., 2020; Bradbeer *et al*., 2019; Fisher & Newton, 2014). Their dynamic, adaptable nature is intended to foster 21st-century skills more effectively than traditional classrooms (Mahat *et al*., 2018).

Two key aspects emerge from this definition. First, space is conceptualized as a carefully designed, flexible area where technology is integrated. Second, it must be used innovatively to enable student-centred learning experiences. Recent research has examined how ILEs support creativity (Davies *et al*., 2013), influence learning outcomes (Byers *et al*., 2018; Fahrani, 2023), and operate within higher education (Khamitova, 2023). Overall, literature suggests that ILEs should be sensitive and inclusive to individual and group differences, including backgrounds, prior knowledge, motivation, and skills, while providing personalized, qualitative feedback (Anderson & Boyle, 2019; Rogeiers, 2016).

This emphasis on student-centred, competency-based education is reflected not only in academic research but also in policies and guidelines from international institutions (European Union, 2018; OECD, 2017; Scott, 2015a and 2015b; Tena & Carrera, 2020; UNESCO, 2017) and national governments, such as Spain's LOMLOE (2020).

Yet, how to achieve these environments remains a pressing concern. Studies show that teachers are highly interested in training on the topic (Lozano *et al*., 2024). To design the questionnaire for this study, two key tools were considered: the Future Classroom Lab (FCL) Toolkit (European Schoolnet, 2024). The Toolkit comprises five phases of school transformation: identifying stakeholders and trends (KIT 1), analyzing the current context (KIT 2), designing scenarios and activities (KITs 3 and 4), and evaluating outcomes (KIT 5). Spain's national government (INTEF, 2024) and the Generalitat Valenciana (2024) further adapted it into the "Transformative Kit" within the Aulas Transformadoras (AT) project, adding a transitional phase focused on school organization and teacher training. These kits have been disseminated through websites, training sessions, and visits to existing ILEs.

By identifying institutions at different stages of this journey, the aim is to analyse their processes and uncover common elements to guide future educational transformation.

Method

The research, conducted from October 2023 to June 2024, is an exploratory descriptive quantitative study with a non-experimental design using a questionnaire (McMillan & Schumacher, 2005). As the research scenario unfolded in a real-world context, this method was considered the most (Losada López & López-Feal-Ramil, 2003).

Process of development and validation of the instrument

An *ad hoc* questionnaire was developed to gather information on schools' educational transformation processes. Over fifty potential items were initially identified; after analysis, those without unanimous agreement were discarded, resulting in 26 items (35 including "Other" follow-ups) grouped into four dimensions: General Information, Change Process, Training, and Results.

Seven experts evaluated each item's clarity and importance following Lawshe's guidelines (1975), adapted by Tristán-López (2008). Clarity was rated on a four-point Likert scale (4 = Very high to 1 = Very low), and importance as Essential, Useful but not essential, or Not important. Experts also provided open-ended suggestions. Content Validity Ratio (CVR) were calculated; eight items with CVR<0.62 were revised or eliminated. In a second round, all items exceeded 0.62.

Experts were selected for their training in ILEs or the FCL framework and their roles as teacher trainers. All were active compulsory education teachers with extensive experience supporting professional development; three held PhDs and two master's degrees. Their feedback improved 21 items, resulting in a final 35-item online questionnaire, administered electronically with Likert-scale and closed-choice responses (e.g., Yes, No, In process).

Sample

A total of 48 teachers from Early Childhood, Primary, and Secondary Education in public schools of the Valencian Community participated, although two responses were excluded for not meeting requirements, leaving 46 valid. Selection targeted schools engaged in a recognized transformation process, defined in ILE literature as implementing student-centred methodologies, redesigning learning spaces, and integrating digital resources.

The questionnaire was sent to 57 schools identified by the four researchers, who were then responsible for supporting and training teachers in these transformations, making this a convenience sample. Each school was invited to participate through a single respondent, preferably a management team member or innovation coordinator. Consequently, the responses represent 46 different schools. Both public and private schools were eligible, but only public-school teachers responded. Of these, 71 % (f = 33) taught Early childhood or Primary Education and 26.1 % (f = 12) taught Secondary Education (and 1 was lost).

Finally, the responses from teaching staff were collected anonymously during April and May 2024.

Data analysis

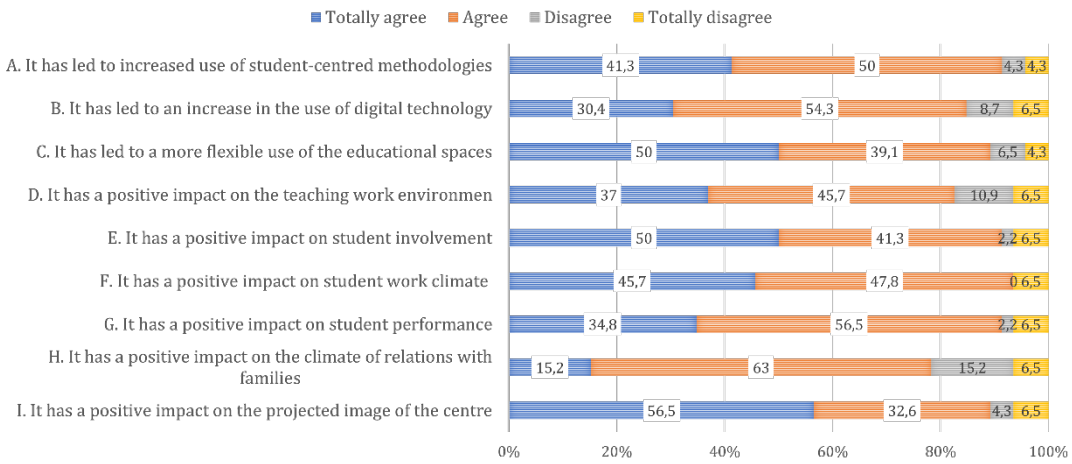
Data were analysed with IBM SPSS 28. Measures of central tendency and dispersion were employed to examine. Tests for normality and homogeneity showed that parametric assumptions were not met, so non-parametric tests were applied, more suitable for ordinal data and non-normal distributions. Specifically, the Mann–Whitney U test compared responses between two independent groups, and effect sizes were calculated using Rosenthal's r to assess the practical relevance of differences.

Results

How does an ILE transformative process impact in a school?

Figure 1 answers the first research question, gathering teachers' perceptions on different statements.

Figure 1
Descriptive analysis (frequency) of answers to question 31: How much do you agree with the following statements? (N = 46)

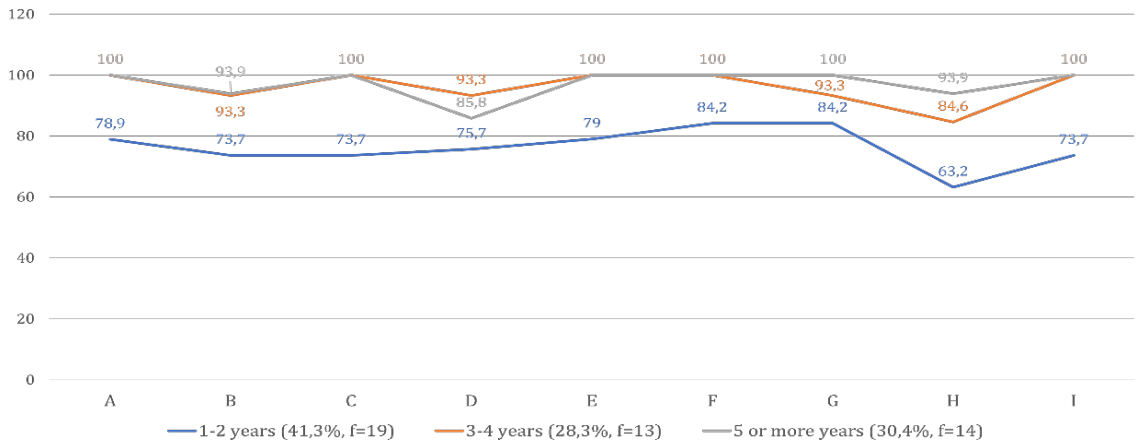


A positive impact is perceived across all aspects. The highest percentages were for the school's image (89.1 %) and digital technology use (89.1 %), student involvement (91.3 %) and achievement (91.3 %), student-centered methodologies use (91.3 %), and especially the students' work climate (93.5 %), the most positively rated aspect. The lowest result concerned relationships with families, although still 78.2 % of schools reported improvement. This may reflect the challenge of involving families in innovation processes focused mainly on internal dynamics and spatial reconfiguration, which may not immediately involve or be visible to external actors such as families.

These results suggest that the transformation processes are perceived not only as structural changes but also as catalysts of deeper pedagogical shifts, particularly toward student-centred practices supported by digital tools. The weaker impact on family relationships suggests a need for more intentional inclusion of families in the transformation.

Schools with longer implementation consistently report higher positive responses across all items, often reaching full agreement, suggesting that the perceived impact strengthens over time, reinforcing the importance of continuity and sustained effort (Figure 2).

Figure 2
Descriptive analysis (frequency) of question 31 conditioned by years of transformation



How is the ILE transformative process?

To address the second research question, a descriptive analysis of the schools' transformation process was conducted, organised into three stages: (1) beginning and first steps, (2) implementation and (3) assessment.

Stage 1: Beginning and first steps

This section compiles 3 questions. The first one refers to the trigger that initiated the change (Figure 3).

The data show that 80.4 % (f = 37) related the beginning of their transformation process to a training experience, either formal training, a visit to an ILE, or contact with a school or teacher already involved in the process. Similar percentages for "Training" (34.8 %, f = 16) and "Visit to an ILE" (30.4 %, f = 14) shows a high impact of both training experiences. Experiential learning thus emerges as a key trigger for school transformation, highlighting the power of direct exposure and professional inspiration.

Figure 4 presents the responses regarding first action taken after the decision to initiate the transformation process. 26.0 % (f = 12) of respondents sought external support, while 71.8 % (f = 33) took internal initiatives within the school, such as applying for projects, creating leadership committees or organizing in-house training.

Figure 3

Descriptive analysis of question 9: What was the trigger to initiate the change? (N = 46)

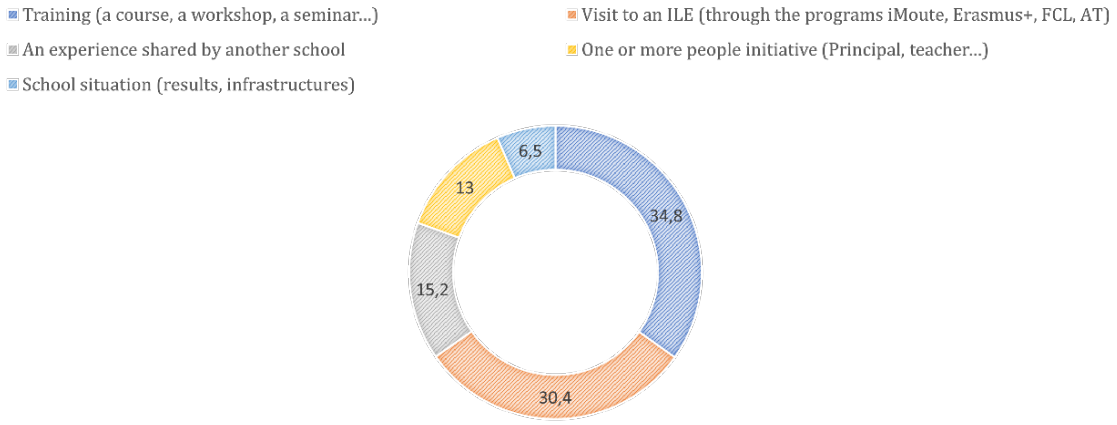
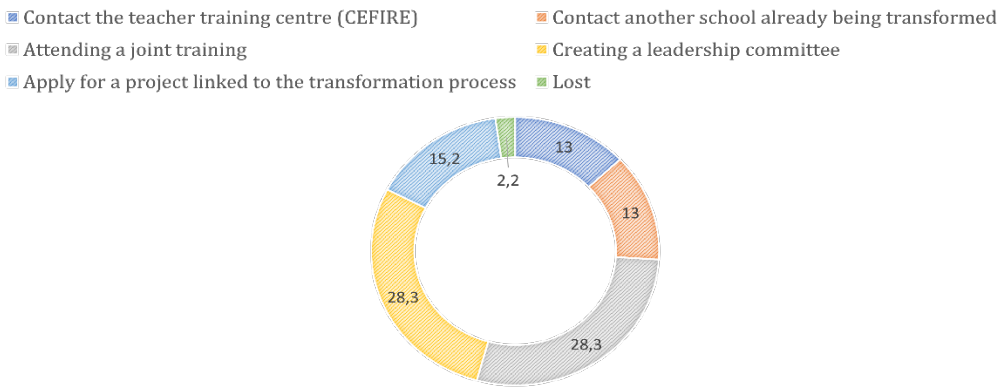


Figure 4

Descriptive analysis of question 17: Once the decision to begin the transformation was taken, what was the first step to start the process? (N = 46)

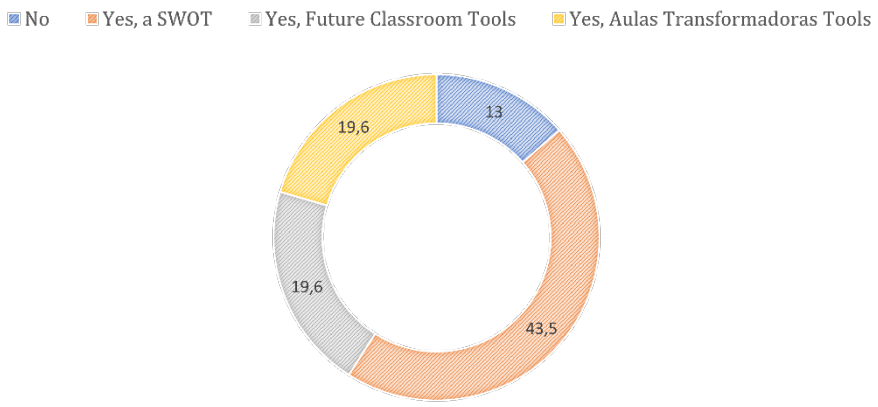


Most schools initiated change by activating internal capacities, reflecting agency and collaboration, while some also sought external support. This suggests that effective transformation blends autonomy with external input. Future research should explore how pre-existing conditions influence strategic choices.

Aligned with the theoretical framework, some teacher training programs for ILEs begin with reflection on current contexts and innovation levels. The study therefore asked whether the tools facilitated for this reflection are used during the early stages of transformation (Figure 5).

Positive answers outweighed negative ones: 82.7 % (f = 38) reported using strategies to diagnose their starting point, with 39.2 % (f = 18) specifically applying ILEs tools. This suggests that most schools value diagnosing initial conditions to guide change, reflecting a culture of informed, reflective practice. Limited access, training, or institutional support may explain why some schools did not use these tools, potentially hindering transformation.

Figure 5
Descriptive analysis of question 20: Has the starting point been analysed with any tool or strategy? (N = 46)



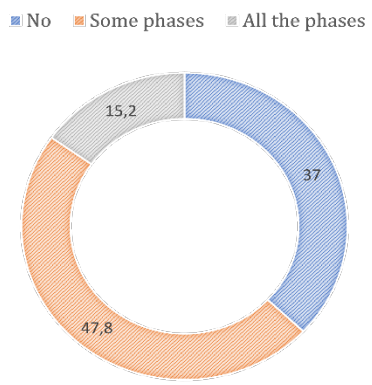
Stage 2: Implementation phase

Answers related to this phase have been classified according to different categories.

1. Use of the transformative tools

First of all, there is an interest in knowing if schools are using the transformative tools created (Figure 6).

Figure 6
Descriptive analysis of question 22: Have you implemented the transformation kit? (N = 46)



As shown in figure 6, most respondents reported using this kit (62.0 %, f = 29). This use was not significatively related to positive impacts on the specific aspects teachers were consulted about, which does not necessarily imply that these tools are ineffective, but rather that their influence may be indirect or dependent on other contextual variables, or less immediate.

2. Leading team and stakeholders

Both ILE toolkits include a phase requiring the creation of a leading team or commission, so its creation and members are explored (Figure 7).

Figure 7
Descriptive analysis (percentage) of question 13: Has a leading team been created to drive the change process? And question 14: Who comprises this team? (N = 46)

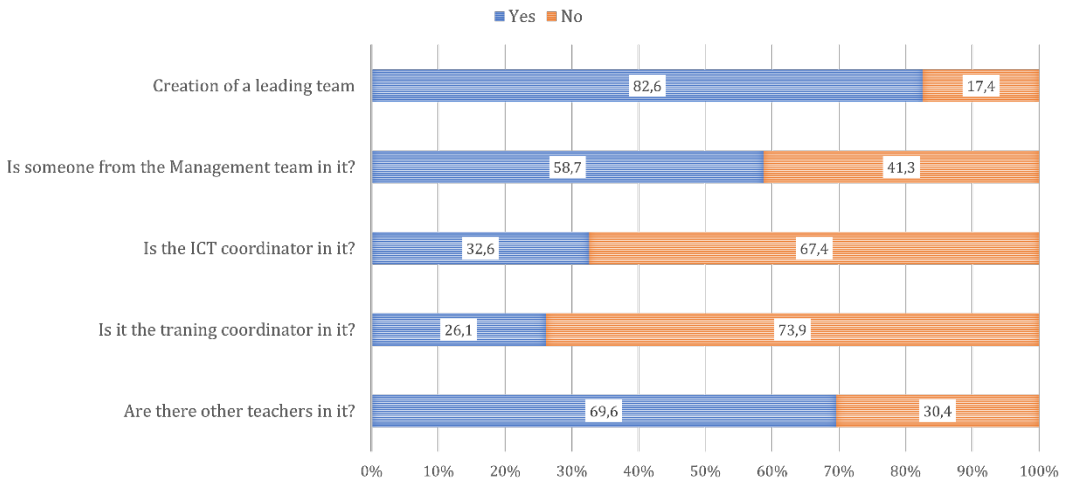
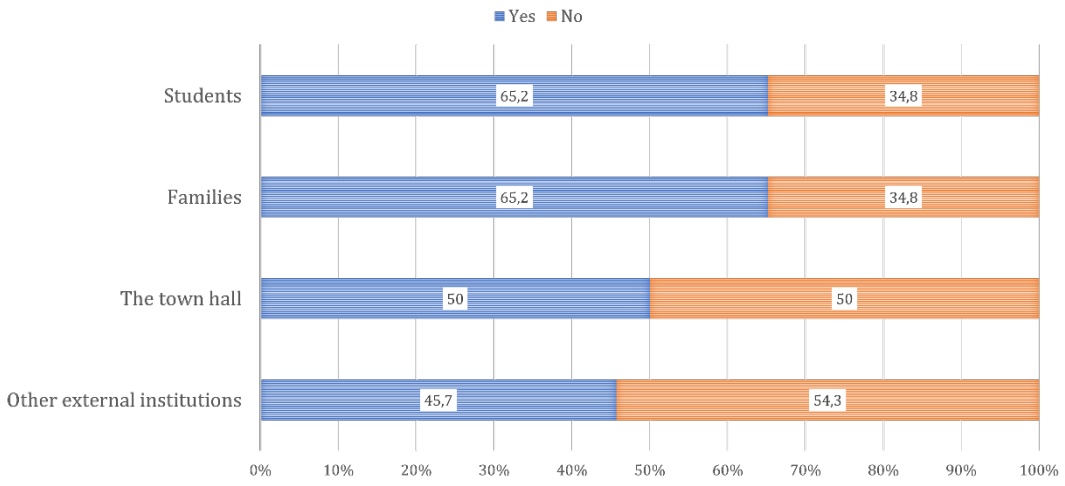


Figure 7 shows that a significant majority (82.6 %, f = 38) created a leading team. Regarding the members' profile, 58.7 % included a management team member, while ICT or training coordinators were less frequently involved. The creation of these teams reflects an institutionalization of the process, though the lower presence of certain roles might also reveal structural constraints (e.g., staff availability, school size) or limited awareness of their strategic.

On another note, during the implementation phase involving other key stakeholders is considered essential, so this was specifically addressed (Figure 8).

Figure 8
Descriptive analysis (percentages) of question 16: In the transformative process, you have involved... (N = 46)



According to the data, 65.2 % of schools (f = 30) involved students and families, while 50 % (f = 23) included the town hall.

These results can be linked to the perceived impact of the transformation process. After rejecting normality through the Kolmogorov-Smirnov test, the Mann-Whitney U test revealed that schools involving students reported a significantly more positive impact on the school's image (U = 164.50, Z = 1.966, p = .049, r = .29) and the teachers work climate (U = 152, Z = 2.197, p = .028, r = .33).

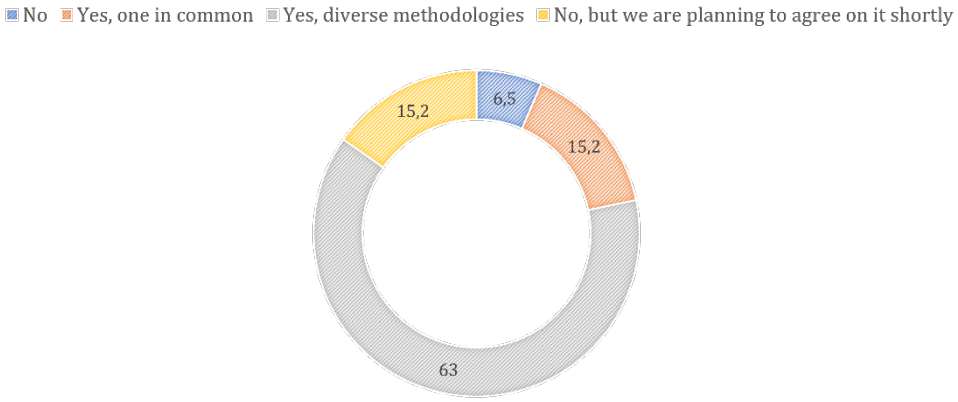
Both effect sizes were small to medium, indicating statistically significant but modest yet meaningful practical impacts. Family involvement was significantly associated with better student involvement (U = 129.00, Z = 2.854, p = .004, r = .42), classroom work climate (U = 148.00, Z = 2.379, p = 0.017, r = .35), and student performance (U = 136.00, Z = 2.720, p = .007, r = .40). Effect sizes ranged from medium to large, showing that family involvement had a meaningful impact on key outcomes. In contrast, town hall or other external institutions involvement showed no significant impact.

These findings suggest the critical role of students and families in enhancing the quality and visibility of transformative processes. Student participation seems to foster ownership and motivation, generating more positive internal and external perceptions. Similarly, family's involvement seems to contribute to a more supportive and collaborative climate, which is positively reflected in students' attitudes and academic outcomes. Nevertheless, the quantitative data do not capture the depth or nature of this collaboration, underscoring the need for complementary qualitative insights.

3. Methodologies

The toolkit guiding transformation includes a stage where teachers reflect on and select a methodology to implement. To examine this, two specific questions were included (Figure 9).

Figure 9
Descriptive analysis of question 19: Have one or more methodologies or didactic strategies been agreed upon for the faculty to implement? (N = 46)



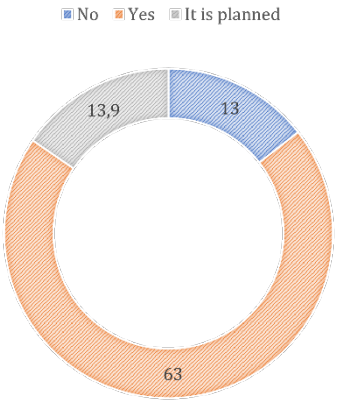
78.2 % of schools reported having reached an agreement on the implementation of a specific methodology or a group of methodologies, with the latter being the most common (63.0 %, f = 29).

To explore the potential impact of this agreement, a Mann-Whitney U test was conducted, revealing statistically significant differences indicating that schools with a methodological agreement reported a greater positive impact on students' work climate (U = 99.00, Z = 2.418, p = .016, r = .36) and performance (U = 112.00, Z = 2.054, p = .040, r = .30). Both effects were of medium magnitude, suggesting that the methodological agreement was not only statistically significant but also of practical relevance in shaping students' experiences and outcomes.

These findings suggest that reaching a collective agreement on pedagogical approaches may contribute to a more cohesive and consistent teaching environment, positively influencing students' learning conditions and academic outcomes.

The second question explored students' engagement in the learning process (Figure 10).

Figure 10
Descriptive analysis of question 24: Has the faculty collaboratively planned learning situations or action proposals with the students? (N = 46)



Most respondents involve pupils in the decision-making process of their own learning (63.0 %, f = 29), while some who do not currently do so expressed an intention to so implement this practice in the near future.

To further analyse this aspect, responses were recoded to examine their relationship with the perceived impact of the transformation process. The Mann-Whitney U test revealed significant differences: involving students in decision-making is associated with a positive impact on student performance (U = 155.50, Z = 2.349, p = .019, r = .35) and on the quality of relationships with families (U = 172.00, Z = 1.968, p = .049, r = .29). Positive responses are also significantly related to an increased use of student-centred methodologies (U = 142.50, Z = 2.638, p = .008, r = .39) and digital technologies (U=127.00, Z=3.020, p=.003, r=.45). Effect sizes ranged from small-to-medium to large, suggesting that these associations are not only statistically significant but also educationally meaningful. The strong association between student involvement and the use of student-centred and digital approaches points to a broader pedagogical shift positioning learners as active agents. These findings reinforce the idea that meaningful student participation is both a driver and an indicator of educational innovation, requiring a school culture that supports autonomy, trust, and shared responsibility.

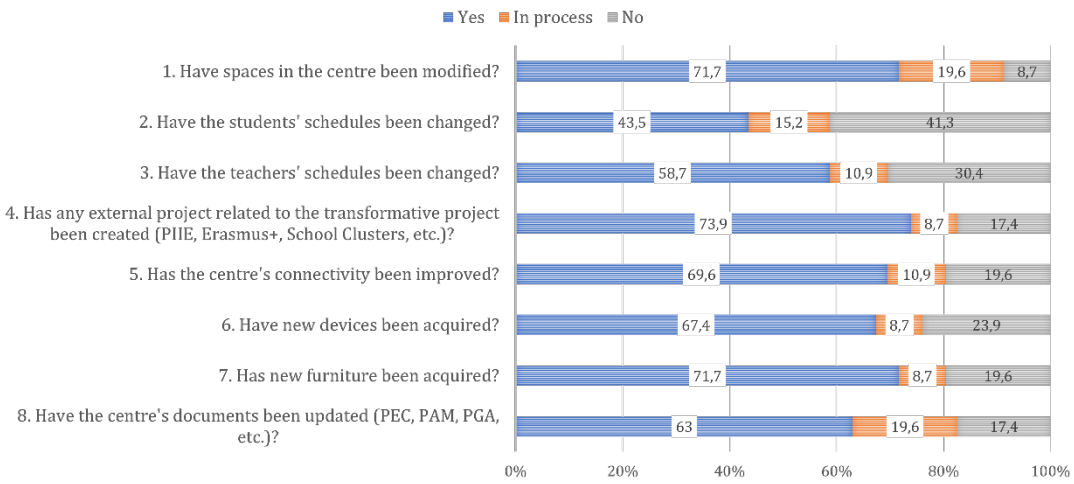
4. Organisational changes

Figure 11 explores the third phase of the toolkit, which invites schools to decide on key organisational aspects, including learning spaces, timetables, and digital connectivity.

The highest number of positive responses concerned the creation of external projects connected to the transformation, reported by 73.9 % of schools (f = 34). Around 75 % of schools answered “yes” or “in process in most organisational aspects, except for changes to students’ and teachers’ timetables, where positive responses were lower.

After recoding the answers, the Mann-Whitney U test revealed significant differences in several aspects. Changes of space were associated with a better school image (U = 140.5, Z = 2.038, p = .042, r = .30). Modifications to students’ timetables related positively to students' involvement (U = 147.00, Z = 2.791, p = .005, r = .41), classroom climate (U = 173.00, Z = 2.161, p = .031, r = .32) and performance (U = 143.50, Z = 2.928, p = 003, r = .43). These adjustments also showed a significant relationship with increased use of student-centred approaches (U = 130.50, Z = 3.199, p = .001, r = .47) and flexible spaces (U = 166.00, Z = 2.307, p = .021, r = .34).

Figure 11
Descriptive analysis (frequency and percentages) of question 23: During the transformative process... (N = 46)

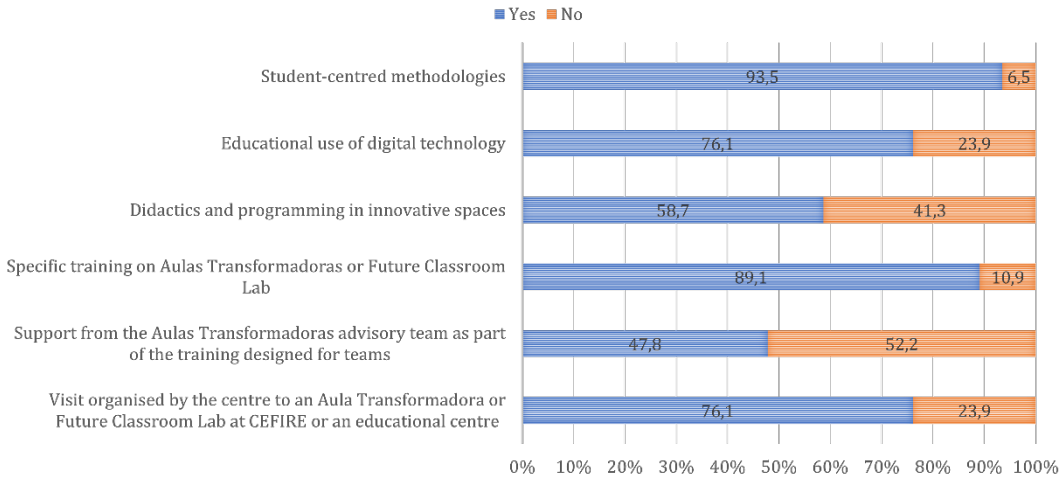


Similarly, teacher timetable changes were significantly related to improvements in students' work climate (U = 168.00, Z = 2.214, p = .027, r = .33) and performance (U = 140.00, Z = 2.948, p = .003, r = .43), and greater adoption of student-centred approaches (U = 158.50, Z = 2.437, p = .015, r = .36). Increased use of digital technology was associated with improved connectivity (U = 115.00, Z = 2.890, p = .004, r = .43) and the acquisition of new devices (U = 100.500, Z = 3.435, p = <.001, r =.51). Updating school documents also corresponded to more positive outcomes across all impact-related items (p < .015). Overall, effect sizes ranged from medium to large, indicating that organisational changes were not only statistically significant but also of substantial practical relevance.

5. Training

As training is a key component of the transformation process, teachers were asked about the types of training received (Figure 12).

Figure 12
Descriptive analysis (frequency and percentage) of question 28: What training have you received regarding the transformation process? (N = 46)



The highest number of positive responses referred to training on student-centred methodologies (93.5 %, f = 43), followed by training linked to the FCL or similar models (89.1 %, f = 41). High percentages were also reported for training on the educational use of digital technology (76.1 %, f = 35) and for visits to ILEs.

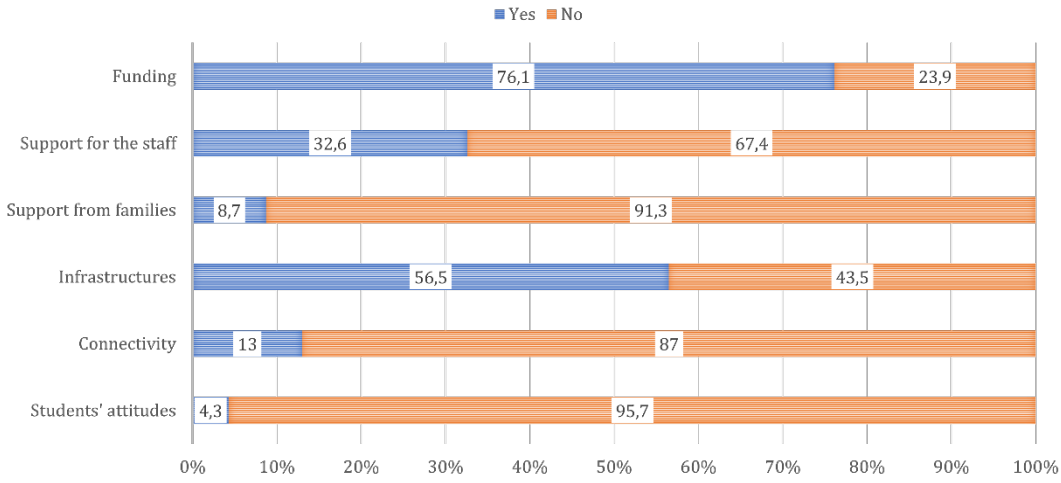
Mann-Whitney U test revealed significant differences between the training and perceived impact. Training on student-centred methodologies related to better student involvement (U = 24.00, Z = 2.009, p = 0.45, r = .30) and student work climate (U=25.00, Z=1.970, p=0.49, r=.29). Training on the educational use of digital technology was linked to improvements in classroom climate (U = 99.00, Z = 2.700, p = .007, r = .40), student performance (U = 122.00, Z = 2.059, p = 0.39, r = .30), family-school relationships (U = 104.00, Z = 2.645, p = .008, r = .39), staff climate (U = 72.00, Z = 3.359, p = <.001, r = .50), as well as with an increased use of digital tools (U = 123.00, Z = 1.988, p = .047, r = .29). Training on didactics and programming in innovative spaces was significantly linked to a positive impact on student work climate (U = 168.00, Z = 2.214, p = .027, r = .33) and performance (U = 153.50, Z = 2.606, p = .009, r = .38), as well as to an increased use of student-centred approaches (U = 158.50, Z = 2.437, p = .015, r = .36) and digital technology (U = 149.50, Z = 2.651, p = .008, r = .39). Overall, effect sizes ranged from medium to large, suggesting that targeted professional development has not only statistically significant but also practically relevant impacts on the transformation process.

These findings suggest that targeted professional development plays a crucial role in shaping the depth and scope of the transformation process. Notably, 73.9 % of schools (f = 34) reported that such training was included in their annual internal program.

6. Problems/challenges

Teachers were asked whether they encountered difficulties in certain aspects (Figure 13).

Figure 13
Descriptive analysis (percentage) of question 26: Main challenges encountered (select those that apply)? (N = 46)



The main difficulties reported concerned funding (76.1 %, f = 35) and infrastructure (54.5 %), underscoring structural barriers to implement significant transformations, particularly in terms of accessing sufficient resources and adapting physical spaces to support new pedagogical approaches.

In contrast, student attitudes and family support were rarely seen as obstacles, suggesting a generally favourable reception of the process.

Stage 3: Assessment

Most schools do not formally document the transformation process (63 %, f = 29), while only 37 % (f = 17) reported doing so. In contrast, the majority (80.4 %, f = 37) schedule regular moments for reflection and assessment.

Mann-Whitney U test results showed significant associations between this last and the perceived impact in: students' involvement (U = 1.500, Z = 2.568, p = .010, r = .38), student work climate (U = 9.000, Z = 2.025, p = .043, r = .30), family relationship (U = 4.000, Z = 2.414, p = .016, r = .30) and the school's image (U = 7.500, Z = 2.222, p = .026, r = .33). It is also linked to an increased use of student-centred methodologies (U = 1.500, Z = 2.524, p = .012, r = .37), digital technologies (U = 4.000, Z = 2.309, p = .021, r = .34) and flexible learning spaces (U = 2.00, Z = 2.517, p = .012, r = .37). These medium effect sizes suggest that regular opportunities for reflection and assessment play a meaningful role in the success of transformation processes.

These findings suggest that establishing regular spaces for collective reflection and assessment is a critical component in the success of transformation processes. The lack of formal documentation in most schools (63 %) may reflect a low prioritisation of it, what may make the evaluation process harder.

Discussion and conclusions

The descriptive and comparative analyses indicate teacher's positive perceptions regarding transformation processes linked to ILEs. Although the design does not allow causal inference, this limitation highlights a potential avenue for future research.

Regarding the first research objective, which examined teachers' perceptions of the transformation process impact, findings confirm that ILEs are associated with increased use of student-centred methodologies, in line with previous studies (Charteris & Smardon, 2019; Mahat *et al*., 2018), as well as greater use of digital technologies (Martín-Lucas & Sánchez-Rojo, 2022) and flexible learning spaces (Bradbeer *et al*., 2019; Fisher & Newton, 2014).

The study also explored perceived effects on the professional work climate, school-family relationships, and the school's public image. While promising, these findings call for deeper qualitative inquiry to identify specific strategies behind these improvements.

Similarly, the perceived positive impact on students, particularly regarding engagement, performance, and classroom climate, aligns with prior research (OECD, 2013). However, other studies (Hornstra *et al*., 2014; Robinson & Munro, 2014) caution that students with specific needs may be negatively affected by certain ILE features, such as increased noise or lower structural predictability. A differentiated analysis of student impact would therefore be valuable.

Overall, the transformation process is viewed as promoting effective and enjoyable educational experiences. Although likely influenced by additional internal and external factors, teachers report broadly positive perception of ILEs across multiple dimensions of school life. The progressive increase in reported impact based on the number of years of involvement underscores the importance of time, consistency, and sustained commitment for achieving positive change.

Concerning the second research objective in the "Beginning and first steps" stage teachers identified the main trigger for initiating the transformation process. Training experiences—such as formal courses, visits to ILEs, or learning from other schools—were cited by 80% of respondents as the catalyst for change. Although responses were limited to one option, and such decisions are inherently multifactorial, the aim was to identify the most influential factor.

The reported impact of training on the transformation process aligns with previous research linking successful ILE implementation to teacher professional development (Rojas Carrasco, 2019; Granda-Pinan & Rojo-Bofill, 2024). These findings highlight the importance of training as a key lever for principals, coordinators, and policymakers in planning innovation. Response patterns suggest that training should be structured, experiential—such as ILE-focused school visits—and involve whole-staff participation to foster collective engagement and consistency. Furthermore,

training should be sustained and integrated into broader strategic planning, rather than delivered as isolated activities.

Two additional questions addressed the early stages of the transformation process, addressing the recurring concern of how to begin. . The most frequently cited first steps were the creation of a leadership committee and participation in joint training (both 28.3 %). These two actions reflect a strong collective commitment. Their equal frequency highlights two key dynamics: the need for internal coordination and the importance of shared professional learning as catalysts for change, consistent with OECD (2013) and Bull and Gilbert (2012) respectively. Similarly, joint training is seen not only as preparation but also as a means of building a shared professional identity, align visions, fostering trust, and developing a common language, key elements for initiating broad change.

A related question asked whether schools had conducted a self-assessment. While 82.7 % reported using some tool, only 39.2 % used the ILE ones. Although these align with Schildkamp *et al*. (2013), providing a flexible foundation for initiating professional dialogues, they may be perceived as more restrictive than a SWOT analysis.

The second stage, "Implementation phase", showed that 62 % of respondents used tools provided by public ILE programmes such as AT or the FCL, indicating a relatively high alignment with official guidance. However, no significant statistical relationship was found between their use and the perceived impact of the transformation process, prompting a more critical analysis.

One explanation may be that the tools are applied superficially or without connecting the results to action plans, limiting their transformative potential. Another possibility is limited awareness of their existence or value. This reflects Fullan (2009) argument that system-led reforms often fail when relying on standardised solutions disconnected from school realities. While these programmes advocate for contextual adaptation, they also depend heavily on teacher engagement and initiative. Thus, despite their widespread adoption, their impact appears limited unless supported by deeper professional involvement, coaching, and collaborative design. Most schools (82 %) created a leading team involving various staff members. Future studies could explore how team composition relates to success. Stakeholders involvement was reported by 65.2 % of respondents, including students and families, although the study did not gather details about their participation. Schools reporting a better public image often involved students, while those engaging families noted positive impacts on student involvement, classroom climate, and performance. Although these results do not establish causality, they suggest areas for further investigation.

Respondents who reported agreeing on common methodologies, being those 78.2 %, also noted a positive impact on students' work climate and performance. While causality cannot be confirmed, this supports Hargreaves and O'Connor (2020) and the OECD's (2013) view that collaborative teaching as key to inclusion and participation.

Similarly, schools involving students in planning (63) reported positive impacts on student performance and family-school relationships, consistent with previous research linking student-centred strategies to better outcomes (Byers *et al.*, 2018; Fahrani, 2023).

Material and organisational changes, such as adjusting students' and teachers' schedules, were linked to reported improvements in students' work climate and performance. Likewise, schools aligning their official documents with the transformation also reported improvements across all areas. While causality cannot be established, these relationships warrant further exploration. Training likewise showed positive impacts, depending on its focus, consistent with earlier conclusions.

This analysis does not differentiate between schools implementing extensive changes and those making fewer adjustments. While such contextualisation would enrich the interpretation and clarify impact variations, it lies beyond the scope of this study and is proposed for future research. Future work should also include triangulation with perspectives from other teachers, students, and families to reduce social desirability bias and enable deeper analysis.

The third stage explored assessment. Schools scheduling moments for reflection and evaluation reported positive impacts across all areas, suggesting that regular assessment is a key component of transformation processes, strengthening internal coherence, collaboration, and continuous improvement. It was also related to better work climate, possible due to a sense of shared and supported process.

The analysis identified key elements that facilitate or hinder the transformation process, addressing the study's third research objective. Based on the strategies common to schools moving towards ILEs, educational leaders should consider key actions: first, providing initial experiential training, such as school visits or immersive workshops, as an effective starting point; followed by a self-assessment phase to reflect on readiness and areas for improvement.

During implementation, schools should establish a leadership team and actively involve students and families. Using available transformation tools supports decisions on shared pedagogical approaches, schedules, spaces, and professional development. Incorporating trainings into the school's annual plan ensures continuity, while regular reflection and assessment enhance internal coherence and external visibility.

Funding and infrastructures were identified as the main barriers to transformation, outweighing issues such as staff or family support, connectivity, or student attitudes. Educational authorities and school leaders should therefore prioritise sustainable funding, through public investment, partnerships, or grants, and allocate resources strategically to adapt spaces to pedagogical needs. Infrastructure planning should align with pedagogical goals to ensure that space, equipment, and layout support the desired teaching and learning practices.

Limitations

Most limitations have already been noted through the analysis, but some general ones remain. First, the study relies on responses from a limited number of schools, restricting the generalizability of findings to other contexts. Second, while appropriate statistical methods were used, the lack of a controlled experimental design data limits causal inference. Third, data collection was confined to April and May 2024; a longitudinal study would provide deeper insights into the transformative process. Despite these limitations, the study employed a valid instrument that effectively captured key aspects of school transformation, yielding valuable findings.

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Conflicts of Interest

The authors declare no conflicts of interest.

Informed Consent Statement

Informed consent was obtained from all subjects involved in the study.

Data Availability Statement

Data used in this study are available at https://zenodo.org/records/12675752

Authors' contributions

Conceptualización, A.R.G-P., E.T-P., S. T-M., S. F-L.; metodología, A.R.G-P., E.T-P., S. T-M., S. F-L.; validación, A.R.G-P., E.T-P., S. T-M., S. F-L.; análisis formal, A.R.G-P., E.T-P., S. T-M., S. F-L.; investigación, A.R.G-P., E.T-P., S. T-M., S. F-L.; recursos, A.R.G-P., E.T-P., S. T-M., S. F-L.; análisis de datos, A.R.G-P.; redacción del borrador original, A.R.G-P.; redacción, revisión y edición, A.R.G-P., E.T-P., S. T-M., S. F-L.

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