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Analysis of video-annotations on the use of technological resources during the Practicum

Análisis de vídeo-anotaciones sobre el uso de recursos tecnológicos durante el Prácticum

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ABSTRACT
Video-annotations enable new asynchronous interactions between author and reader, document multimedia evidence and promote reflection. With this frame of reference, a study is proposed to find out about good practices, as well as the impacts, difficulties and requirements necessary to implement technological resources in external placements in Education degrees. Twenty-six people with different roles took part in the study. Recorded interviews were conducted and examined by means of video-annotations, the data of which are treated with textual and factor analysis, together with a hierarchical classification technique. The results show 90 text segments consisting of 2,657 words and 751 supplementary active forms, which are grouped into six factors. The results show an unequal distribution of the variables established between the groups and a statistically significant relationship. It is concluded that there is confluence between the employment, communication and monitoring groups on the one hand, and the learning, typology and implications groups on the other. There is also a greater frequency in the categories 'requirements' and 'impact', which shows that the discourse of the interviewees focuses on questions related to the requirements necessary to implement technologies in the Practicum and the improvements they bring to this training period.

RESUMEN
Las vídeo-anotaciones posibilitan nuevas interacciones asíncronas entre autor y lector, documentan las evidencias multimedia y promueven la reflexión. Con este marco de referencia, se plantea un estudio para conocer las buenas prácticas, así como los impactos, dificultades y requisitos necesarios para implementar los recursos tecnológicos en las prácticas externas de los títulos de Educación. Participan 26 personas que poseen roles diferentes. Se han realizado entrevistas grabadas que se examinan mediante vídeo-anotaciones y cuyos datos se tratan con un análisis textual y factorial, junto con una técnica de clasificación jerárquica. Los resultados muestran 90 segmentos de texto constituidos por 2.657 palabras y 751 formas activas suplementarias, que se agrupan en seis factores. Los resultados muestran una distribución desigual de las variables establecidas entre los grupos y una relación estadísticamente significativa. Se concluye que existe confluencia entre los grupos empleo, comunicación y seguimiento, por un lado; por otro, los grupos aprendizaje, tipología e implicaciones. Existe también una mayor frecuencia en las categorías 'requerimientos' e 'impacto', lo que pone de manifiesto un discurso de los entrevistados centrado en aquellas cuestiones relacionadas con las exigencias necesarias para implementar las tecnologías en el prácticum y las mejoras que aportan en este momento formativo.

PALABRAS CLAVES · KEYWORDS
formador de docentes, práctica pedagógica, tecnología avanzada, grabación en vídeo, formación preparatoria de profesores.
teacher educators, teaching practice, high technology, video recordings, Preservice teacher education

1. Introduction

The integration of technological resources in higher education has long been a strategic element, among other reasons, because it caters to a student familiar with them who is characterized as a digital native, an active user of different devices and applications. At the same time, the social environment has undergone changes, many of them derived from the pandemic, which have both forced an accelerated technologization of educational institutions and allowed the creation of professional networks (Ruiz et al., 2021).

This presence and integration of technologies give university students certain technical skills. However, the training of future teachers cannot be limited to mere technological skill which, despite being necessary, must transcend and be addressed along with its pedagogical use (Apple, 2018). This didactic application acquires real meaning in the contexts of pre-professional intership.

The specialised literature agrees that it is essential to consider the role of technologies with new approaches to learning in external curricular internships or practicums. For example, studies such as that of Raposo-Rivas and Martínez-Figueira (2019) point out the need and relevance of these resources at this formative moment, as they favor a more effective development of work during the immersion process in the professional context.

At the same time, the role that technologies represent in curricular interships can provide instrumental (as a work tool), relational (for communication), documentary (in the search for information), institutional (as support to the management of the center and the classroom) or didactic (in the teaching-learning processes) support. All this is developed both in the phases of observation, collaboration and intervention, as well as in those of monitoring, tutoring and evaluation of curricular interships (Raposo-Rivas et al., 2021). Contextualizing in this last moment, Cebrián-Robles and Cebrián-de-la-Serna (2020) insist ***on the fact*** that the use of these tools for evaluation should not be exclusively at the end of the Practicum, but throughout the entire formative process, as they contribute to the development of professional competences.

Among the wide variety of technological tools, in this work we focus on video-annotations or multimedia annotations.

1.1 Video-annotations in university training

An annotation, as explained by Gayoso-Cabada et al. (2019), is a portion of information that is associated with multimedia content to explain something about that content. In academic environments, Cebrián-de-la-Serna et al. (2021) define video-annotations as those annotations that allow multimedia content to be selected and highlighted to provide reflective reasoning in the form of comments, as well as to be shared through social tags, which can be used by students and professors (Novak et al., 2012; Zhu et al., 2020). They act as a tool based on active learning strategies (Mirriahi et al., 2021) enabling the synchronization of comments with the content of the videos. This has the potential to change an otherwise passive experience such as watching an instructional video into a more active one by engaging students with strategies designed to promote active, interactive and self-regulated learning, as well as enhance content knowledge and aid reflective processes.

The benefits of this resource may explain why in recent years we have witnessed a proliferation of studies on video-annotations. In their beginnings, they focus on the tool itself

to evaluate its effectiveness and usability (Monedero et al., 2015; Rich & Trip, 2011; Rolf et al., 2014). Later, the focus of attention is placed on the analysis of the relationship between theory and practice, where multimedia annotations are used as a resource to talk about reflective processes in students (Fook & Nazamud-din, 2017; McFadden et al., 2014; Mirriahi et al., 2016; Mirriahi et al., 2018), being a topic of study that is currently maintained (Aguillon & Monterola, 2020; Cebrián-de-la-Serna et al., 2021).

There is also a specialization towards the field of teacher training (Ardley & Johnson, 2019; Debbag & Fidan, 2020) as it is effective, not only for the development of generic competences such as reasoning, reflective and argumentative capacity (Cebrián-de-la-Serna et al., 2021; Cebrián-Robles et al., 2017), but also of specific ones such as those related to formative evaluation and feedback (Ardley & Hallare, 2020; Gallego-Arrufat & Cebrián-de-la-Serna, 2018). The review carried out in publications from 2014 to 2022 by Von Wachter and Lewalter (2023) on video-annotations in teacher training and their effect on the development of professional competences, confirm their fundamental use for feedback, communication and documentation.

In the context of pre-professional internships, video-annotations imply changes for the improvement of argumentation during the practicum (Cebrián-Robles et al., 2017; Cebrián-Robles et al., 2023; Mcfadden et al., 2014). In particular, they can be combined with internship diaries (Pérez-Torregrosa et al., 2020). Studies such as that of Debbag and Fidan (2020) conclude that video-annotations not only allow to see, review and correct weak points of their training, but also contribute once again to the development of their reflective competence. In addition, video-annotations can support the development of professional networks (Ruiz et al., 2021), sharing video-experiences and analyzing good teaching practices identified in them.

Likewise, some literature reviews on this topic (Cebrián-Robles et al., 2023; Lam & Habil, 2021; Novak et al., 2012; Pérez-Torregrosa et al., 2017; Sauli et al., 2018; Von Wachter & Lewalter, 2023) seek to find out to what extent the use of video-annotations in formative contexts has been explored and thus be able to synthesize the advantages it possesses. The findings confirm what has been indicated so far: that these resources, among others, facilitate reflection and the feedback process. Focused on initial teacher training, the study by Pérez-Torregrosa et al. (2017), after reviewing scientific works on video annotation tools, existing in ERIC, WOS, Scopus and Dialnet during the period 2006-2016, concludes that it is a field of study to be developed since in that decade only 19 studies have been carried out. In addition, the review carried out by Cebrián-Robles et al. (2023), on publications on the same topic in ERIC, Scopus and WOS, from 2018 to 2022, shows the usefulness of video-annotations for the analysis and reflection on internships, particularly pre-professional ones.

In the work that concerns us here, in contrast to what is usually investigated, we move forward to show how video-annotations can be a research tool, in the line developed by Ruiz et al. (2021), in contexts of study about pre-professional internship.

2. Methodology

This work is born in the context of the TICPraxis network, which is concerned with the study and development of educational innovation and the use of information and communication technologies (ICT) or technological resources before, during and after the

periods of Practicum and external inernships (curricular and extracurricular). In this context, the use of video-annotations in initial teacher training is incorporated with the aim of showing how these can be an appropriate resource in research, both for the formal analysis of discourses and content. For this purpose, a case study of mixed design is proposed.

2.1 Participants

In the study, 26 participants are involved who play different roles at different times in the research. First, an interview is conducted with 6 informants: a vice-dean responsible for the management of the Practicum of the Education degrees, four interns (one from the Primary Education degree and three from the Master's degree in Secondary Education Teaching), and an academic tutor from the Early Childhood Education degree. This offers a polyphony of six voices on the same issue. Subsequently, 20 experts from 5 national and foreign universities, members of the aforementioned network, analyze and label the video of the interviews.

2.2 Instrument

For data collection, a semi-structured interview is used, common to all members of the TICPraxis network that is posed to all agents linked to curricular internships at the University: students, future teachers, academic tutors and managers of these internships. The guiding questions of the dialogue were the following (Romero et al., 2021):

- Describe some good practice where technologies are used either for orientation, tutoring and/or evaluation in the practicum, external internships and/or Bachelor´s Thesis (TFG) and Master's Thesis (TFM).
- Can you indicate what technology it is and what its main function is?
- How do you use technologies to promote collaboration between interns and/or with internships tutors distributed in different centers?
- What impact, improvement, facilitation… do you consider most relevant that these technologies contribute to the Practicum?
- What type of major difficulties do you find in the use of technologies in the Practicum?
- Do you consider any requirement essential before using or implementing technologies in the Practicum (privacy policies, prior training…)?

This interview was recorded independently, and then edited into a video whose interventions are based on each of the questions.

2.3 Procedure

The interviews are conducted by a member of the research group at one of the sites participating in the TICPraxis network and edited into a single video that is first reviewed and analysed by the research team at that site. The recording is then shared with all the

researchers in the TICPraxis network via a link to YouTube and published on the Coannotation® platform. From this point on, the 20 members of the network have one week to annotate the different sequences of the video, using the tags previously agreed upon and defined in the work environment. These tags correspond to the interview questions: 'good practices', 'function', 'collaboration', 'impact', 'difficulties' and 'requirement'. At the same time as the tagging was taking place, the authoring team of the recording responded to the questions, doubts or suggestions that emanated during the viewing and tagging.

2.4 Data analysis

After viewing and tagging the videos, the annotations generated on the Coannotation® platform are exported to a spreadsheet and subjected to the corresponding data treatment. For this analysis, three variables derived from the annotations made on the video have been defined:

- The person who has made the comment, coded with letters ranging from A to N.
- The tags 'good practices', 'function', 'collaboration', 'impact', 'difficulties' and 'requirement', referring to the uses of ICT in external internships.
- The video time to which each annotation refers, being 'low' if it does not exceed 60 seconds, 'medium' from 61 to 120 seconds and 'high' when it is more than 120 seconds.

In addition, the textual data analysis proposed by Benzécri (1981) has been considered as an appropriate method in the present study. Subsequently, the development and subsequent inclusion of multiple correspondence factorial analysis for linguistic data (Gragé & Lebart, 1991; Lebart et al., 2000) is continued along with the descending hierarchical classification technique derived from the method described by Reinert (2003) which, within textual statistics, employs two multivariate techniques: cluster analysis and factorial analysis. The proposed approach brings together the research potential of computer science, discourse analysis, classical statistics and linguistics. (Sarmiento et al., 2019).

To carry out this analysis, the statistical program IRAMUTEQ (R interface for Multidimensional Analysis of Texts and Questionnaires) developed by Ratinaud and Marchand (2012) under GNU license has been chosen, overcoming four phases: indexing, hierarchical classification, determination of profiles and factorial analysis of correspondences.

3. Analysis and Results

From a descriptive point of view, the video that collects the interviews conducted by the recording author's team after undergoing analysis by 20 researchers from the TICPraxis network, has generated 103 annotations and 51 tags (figure 1). The video sequences have suggested 'good practices' and 'impact' as the most frequent tags, approaching 20% of the

responses (19.6%), followed by ‘function’ (17.6%) and ‘requirement’ (15.7%). Less frequent have been the topics ‘collaboration’ and ‘difficulties’, with 13.7% of responses each.

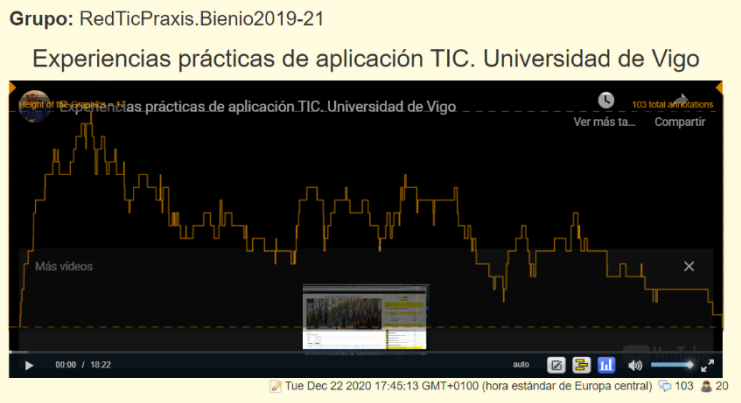
Figure 1

Video Annotation Statistics

At the same time, the Coannotation® tool allows obtaining a visual report (figure 2) on the moments of the recording that have suggested the most comments (the high points) and the least (the valleys).

Figure 2

Graphical representation of the annotations



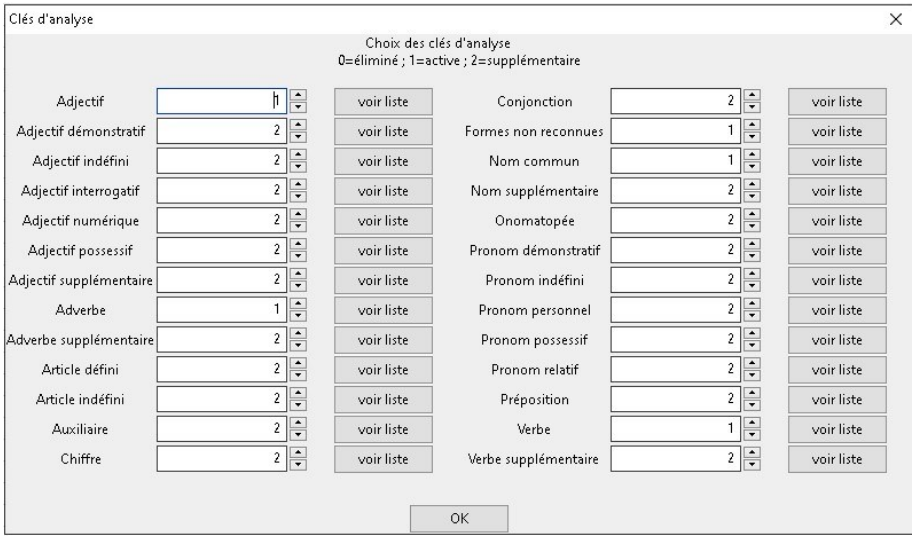
In accordance with the established procedure, the most significant results obtained in each phase of the analysis process are shown below.

Phase I. Indexing

This is the phase in which decisions are made and criteria are established that allow the ordering of data to facilitate their subsequent analysis and interpretation. First, the 103 annotations collected are divided into Elementary Context Units (UCE) to facilitate their analysis. In this case, 'linguistic units' have been chosen, allowing the program's algorithm to determine the most appropriate size. The texts are lemmatized in such a way that words are replaced by their canonical form or root. This first phase of indexing ends with the selection of active forms (nouns, verbs, adjectives, and adverbs) and supplementary forms (determiners, pronouns, conjunctions, etc.). This choice is shown below.

Figure 3

Active forms (number 1) and supplementary forms (number 2)



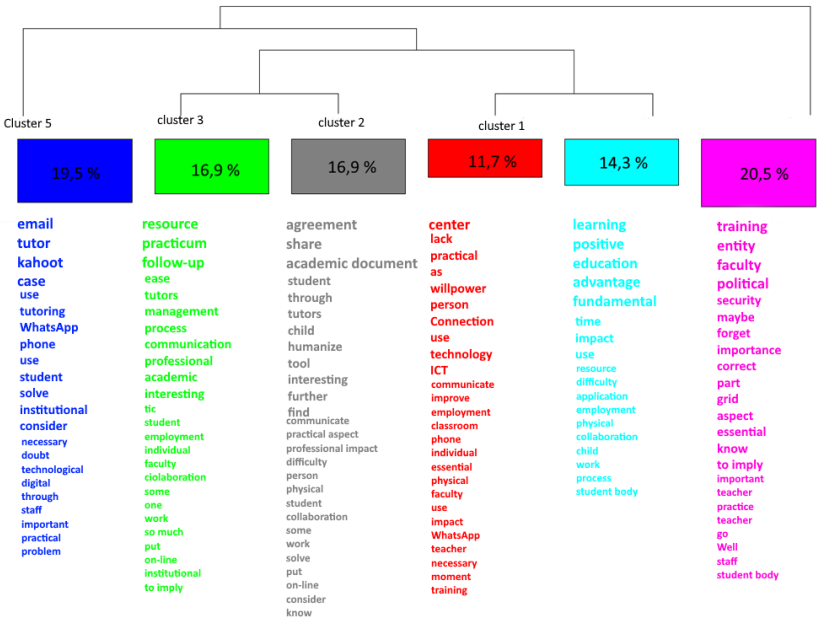
At the end of this first phase, we have 61 initial texts (video-annotations) that have been transformed into 90 text segments. These segments are made up of a total of 2,657 words and 751 original forms, a set of words with the same form (verb, adjective, noun…), remaining at 593 once lemmatized. Of these, 525 are active and 68 are supplementary.

Phase II. Hierarchical Classification

Once the hierarchical classification analysis has been executed, six groups have been obtained that integrate 77 segments of the 90 analyzed (85.56%). The dendrogram resulting from the analysis (figure 4) shows these groups with their respective active forms, which constitutes the lexical world of each one, which will have to be interpreted and then, as observed by Ruíz-Bueno (2017), assigned an identifying label.

Figure 4

Dendrogram generated from descending hierarchical classification, percentage of each lexical class and forms of each class



The identifying labels of each group define their 'lexical world' and can be assigned in multiple ways. In this case, co-occurrence in the appearance of words in the analyzed text segments is used, both their frequency and the proximity between them. Following the procedure described above, propositions can be established that synthesize the 'lexical world' of each group and convert them into their identifying label.

Thus, the proposition that defines the lexical world of group 1 is: 'the use of ICT in the center during the practicum'. In group 2 it can be synthesized in the proposition: 'collaboration and communication between tutors and interns. The sentence corresponding to group 3, complementary to group 2, is: 'ICTs are a valuable resource to promote communication

between tutors and facilitate the monitoring of the Practicum'. The lexical field of group 4 appears close to group 1 and condenses its semantics in the phrase: 'the impact of ICT is positive in the learning process and presents as an advantage the use of time'. Group 5 responds to the types of technologies used and is synthesized in: 'communication occurs, fundamentally, through email, but there are other resources such as social networks or specific applications'. Finally, group 6 focuses on the implications of using ICT during the Practicum, as 'it is a priority to maintain privacy in the data handled, to ensure security for both teachers and interns. In short, group 6 (implications) is the one furthest away from the rest, followed by group 5 (types of technology). There is also a certain pairing between groups 2 (communication) and 3 (monitoring) on the one hand and group 1 (use) and group 4 (learning) on the other.

Phase III. Determination of Profiles

Based on the groups obtained in phase II, the profiles are determined in this phase, taking into account the belonging of each variable defined to each of the six previous groups.. Table 2 shows these groups, the number of texts in them in relation to the total, as well as their percentage. The Chi2 value shows the strength of the link between the variable (with a certain value) and the assigned group; on the other hand, the 'p value' indicates the significance value associated with Chi2.

Table 2

Obtained profiles

Group	Texts in the group/total classified texts	% group texts over the total	Variable	Variable Value	Chi²	P value
1 Uso of TIC	9/77	11,69 %	Time	Alto	10,86	0,00009
			Annotator	K	10,59	0,00113
			Anotator	J	4,15	0,045
2 Communication	13/77	16,88 %	Anotator	M	6,98	0,008
			Anotator	L	3,3	0,06
3	13/77	16,88 %	Anotator	E	15,37	0

Group	Texts in the group/total classified texts	% group texts over the total	Variable	Variable Value	Chi²	P value
Monitoring			Label	Functions	7,09	0,0077
			Label	Collaboration	5,52	0,01
			Label	Good practices	3,3	0,069
			Anotator	J	2,04	0,15
4 Learning	11/77	14,29 %	Label	Impact	17,82	0
			Time	Low	2,22	0,13
5 Types of technology	15/77	19,48 %	Anotador/a	H	4,43	0,03
			Anotador/a	F	2,68	0,1
			Label	Good practices	2,51	0,1
			Anotator	L	2,51	0,1
6 Implications	16/77	20,78 %	Label	Requirements	17,26	0
			Anotador/a	D	8,32	0,0039

It can be observed that the three established variables (annotator, label, and time) are unevenly distributed among the groups, while a statistically significant link is established between variable and group. In this way, it is identified:

- A first profile that associates people K and J, with comments that are located in group 1 (use of ICT in the center during the practicum) and their annotations refer to video times that exceed two minutes.
- The second profile is linked to group 2 (collaboration and communication between tutors and interns) and only presents a significant relationship with person M.
- The third profile is established by considering the labels ‘functions’ (of Technology) and ‘collaboration’ (between interns and/or internship tutors), along with the annotator E, which present a significant link strength with group 3 (ICTs are a

valuable resource to promote communication between tutors and facilitate the monitoring of the Practicum).

- A fourth profile is identified between the label 'impact' (improvement, facilities) and the video-annotations less than 1 minute that are integrated into group 4 (the impact of ICT is positive in the learning process and presents as an advantage the use of time).
- The fifth profile is related to group 5 (communication occurs, fundamentally, through email, but there are other resources such as social networks or specific applications) and despite integrating four variables (three annotators along with the label 'good practices'), only the annotator H is significantly related to it.
- The sixth profile is configured with the annotator D and the label 'requirements' (needs to use or implement technologies in the Practicum) that are integrated with significant link strength into group 6 (during training it is a priority to maintain privacy in the data handled, to guarantee security for both teachers and students).

Phase IV. Factorial Analysis of Correspondences

After the determination of the profiles, the factorial analysis of correspondences was carried out. In the following table, the five factors that explain 100% of the variation or inertia of the data are observed.

Table 3

Obtained factorial analyses

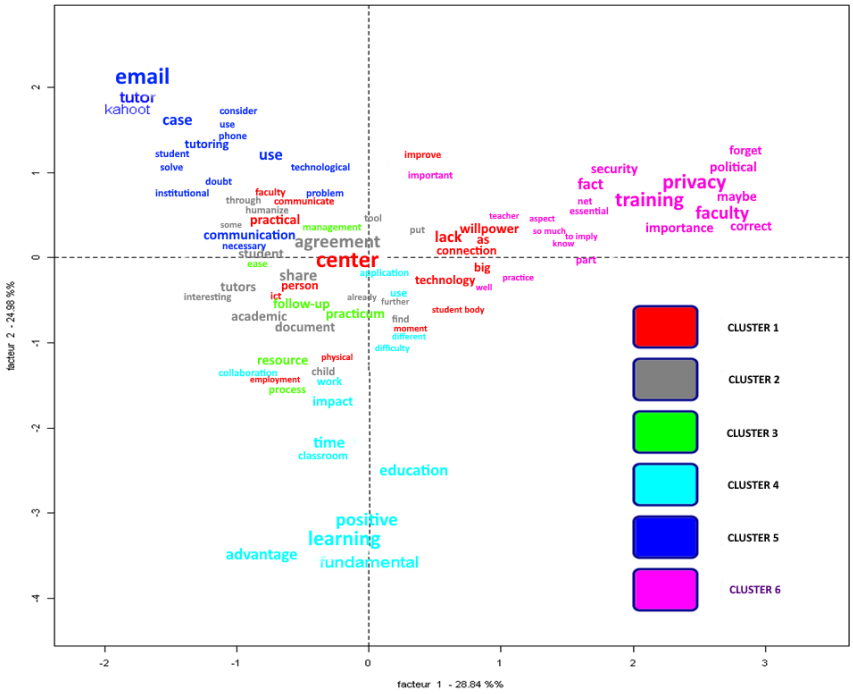
	Eigenvalues	Percentage	Cumulative Percentage
Factor 1	0,46639548	28,8416162	28,8416162
Factor 2	0,40398142	24,981968	53,8235842
Factor 3	0,29296384	18,1167076	71,9402918
Factor 4	0,24575808	15,1975321	87,1378239
Factor 5	0,20799323	12,8621761	100

To perform the flat projection, the first two factors, which explain almost 54% of the inertia, will be established as coordinates. Thus, taking these factors as coordinate points,

we can place all the analyzed elements in a two-dimensional space: texts, variables, and groups obtained in the first phases of the analysis (figure 5).

Figure 5

Analysis and Results From a two-dimensional projection of the first two factors of the active forms



The figure shows the arrangement of the active forms (nouns, verbs, adjectives, and adverbs), as well as the six groups obtained through classification analysis. Three branches can be clearly distinguished, starting from the centre (referring both to the centre of coordinates and the centre as an active form, and to the institution where the internship takes place). The three branches coincide with three of the groups: group 6 (implications) is the most distant overall; group 4 (learning) has one part far away from the midpoint and one part closer; and group 5 (types of technology) has the branch closest to the intersection. The rest of the groups (1 -use-, 2 -communication- and 3 -monitoring-) converge around the coordinate axis.

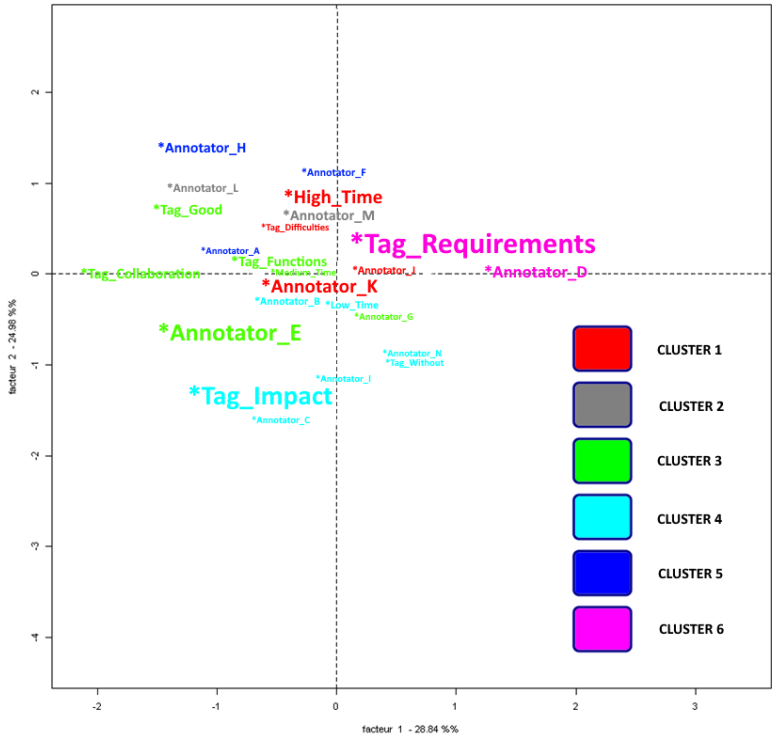
This means that, the center as an institution of internships, is the 'center' (noun/active form) that maintains the balance between the centripetal and agglutinating tendencies of the use of ICT during the Practicum (group 1), as a resource for collaboration and communication between tutors and interns (group 2), and the monitoring of the practicum (group 3), while the implications of ICT in the Practicum (group 6), the positive impact of them on learning (group 4) and their typology (group 5) are centrifugal and expansive tendencies.

The distribution of the variables and their values from the first two factors obtained presents a different arrangement to that found from the active forms (figure 6). The size of

the font in the figure below is directly related to the number of active forms it represents where a larger number of forms implies a larger size.

Figure 6

Two-dimensional projection of the first two factors of the variables annotator, label, and time

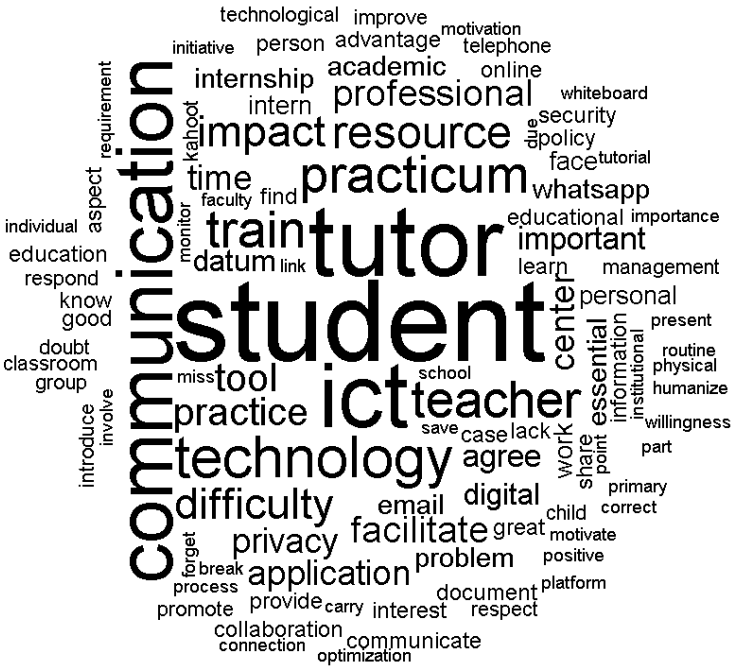


In the figure, it can be observed that the label 'requirements' has the highest number of active forms. As we saw, this label with the researcher D is located in group 6. It is followed by the label 'impact' which with the annotators B, C, I, and N together with the video sequences of less than 1 minute, are linked to group 4. The third frequency reflected in font size is presented in descending order by the commentator E with the labels 'good practices', 'functions' and 'collaboration', the annotator G and the video sequences analyzed between 1 and 2 minutes associated with group 3. The video-annotations based on analysis of more than 2 minutes of video along with the researcher K, represent the fourth largest font size and form group 1 with the annotator J and the label 'difficulties'. Already with a relatively small font size appears the annotator M who, together with L, form group 2 and the annotator H who with person A and F configure group 5.

In synthesis, the frequency of the active forms in the video appears in the following word cloud (figure 7).

Figure 7

Cloud of active forms according to their frequency in the video-annotations



4. Discussion and Conclusions

The opportunities that technological resources hold in the Practicum have been the subject of study and debate over the last few years. Several works have focused on analyzing the possibilities they offer at key moments of this formative period (Cebrián-Robles & Cebrián-de-la-Serna, 2020; Raposo-Rivas & Martínez-Figueira, 2019; Raposo-Rivas et al., 2021) and for each of its protagonists (Ardley & Johnson, 2019), either separately or by the relationships that are generated between them. In the case of the student intern, the future teacher, technologies have been used mainly for communication, the design and development of educational resources, in the creation and resolution of activities, in the management of tasks and information, in the presentation and compilation of information, in classroom management and evaluation. In the case of the person tutoring at the work placement centerr, ICTs have provided opportunities for the preparation of this formative moment, the production of educational resources, the reception of the student in internship at the educational center, in the monitoring and evaluation of the latter or to record significant moments and learning situations. For the university lecturer who plays the role of tutor, these resources provide opportunities for management, tutoring and monitoring, information search, communication between different agents and aassesment.

The vision about the use of technological resources before, during and after the Practicum periods by the 6 members of the recording author's team and jointly analyzed through video-annotations by the 20 members of the TICPraxis network, raises 103 annotations, 51 labels, 90 text segments, 2657 words and 525 active forms. Once the textual statistics on the discourse are applied, six groupings related to: (1) the use of ICT in the

internship center; (2) collaboration and communication between tutors and interns; (3) ICT for Practicum monitoring; (4) ICT in the learning process; (5) the types of technologies used for communication; and (6) the implications associated with the use of ICT are obtained. The factorial correspondence analysis has shown us, on the one hand, the convergence of the first three groups (employment, communication, and monitoring) and on the other, the dispersion of the remaining ones (learning, typology, and implications).

At the same time, this textual analysis allows us to conclude that there is a higher frequency of active forms (lexemes) in the categories 'requirements' and 'impact', which reveals a discourse of the interviewees focused on the topics related to the necessary requirements to implement technologies during the development of the Practicum and the improvements that these bring at this formative moment. Also, the educational institution in which they carry out the internships appears as a central axis, as the origin and destination of all the set of meanings that compose the analysis of the video-annotations (see figure 5). It is identified as a space of relationship and communication, often mediated by technologies, between the teaching staff, the tutors and the interns. But it is also the place that maintains communication between those three groups of meaning apparently without relation and that present their own identity: the requirements, the impact and the typologies of ICT that can be used in the Practicum.

The use of video-annotations as a tool for the development of collaborative reasoning in the training of future teachers has been experimented, among others, by Cebrián-Robles and Cebrián-de-la-Serna (2020), Cebrián-de-la-Serna et al. (2021), concluding that this resource encourages to carry out a reflective reasoning about reality. Video-annotations allow selecting and breaking down messages to provide reasoning in the form of comments and interpretations, studying the quality of the discourse and attributed meaning (Cebrián-de-la-Serna et al., 2021). But beyond its denotative and connotative analysis, with the focus on the signifier and the meaning of the discourse, nuances, traits and inclinations of those who make these annotations can be identified. This study shows that it is possible to identify, and consequently, analyze the intrahistories, which define commentator profiles.

In addition, the study developed confirms that video annotations are shown as an effective methodology for network work among researchers (Ruiz et al., 2021), allowing to know not only the frequency of the units of analysis and active forms, but also the coincidences and discrepancies among the members of the evaluation team.

On the other hand, the resources used and the results of this research are transferable to the different periods of internships existing in all education degrees. Particularly, the study contributes to the strengthening of a line of research focused on the relevant role of technology, both as a resource in formative processes and in the development of competences for professional performance.

Finally, although the use of labels illustrates the process helping users to analyze, organize and interpret the content (Cebrián-de-la-Serna et al., 2021), it is at the same time, one of the limitations detected in the study as they offered a closed framework, sometimes rigid for the argumentative richness observed in the video. This aspect offers the network [title omitted for anonymous review] a path to follow in the future, in which work is being done.

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Aplicaciones tecnológicas relacionadas con la edad temprana infantil

Technology applications related to early childhood

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Spain

Introducción

Decir que las aplicaciones tecnológicas están relacionadas con la primera infancia es quedarse corto.

La primera infancia es un estadio de desarrollo que mejora la vida escolar. Es la etapa más importante para cambiar la vida futura de un niño. La educación de un niño empieza en casa.

La tecnología determina la calidad de la educación temprana de un individuo. La educación infantil mejora los conocimientos, las habilidades y desarrolla la personalidad y la actitud de los niños. Sobre todo, la tecnología en la primera infancia afecta la familia del niño.

Un niño con un alto grado de ayudas tecnológicas aumenta su capacidad de desarrollo.

En este monográfico sobre la importancia de las aplicaciones tecnológicas relacionadas con la primera infancia, discutiremos su valor en la escuela y la familia.

To say that Technology applications related to early childhood is an understatement.

Early childhood is a weapon to improve school life. It is the most important stage for changing future lives. A child's education begins at home.

Technology certainly determines the quality of an individual's early education. Early childhood education improves knowledge, skills and develops personality and attitude of children. Most notably, early childhood technology affects a child's family.

A child with a high level of technological aids increases their developmental capacity.

This monograph on the importance of technology applications related to early childhood will tell you about its value in school and family.

Alcance

El monográfico **Aplicaciones tecnológicas relacionadas con la edad temprana infantil** abordará intervenciones tecnológicas tempranas para niños con necesidades especiales, modelos de atención integral que proporcionan servicios tecnológicos y apoyos de manera holística, abordando las necesidades del niño y su familia de manera coordinada, avances tecnológicos en el diagnóstico precoz con la colaboración de distintos profesionales (médicos, terapeutas, educadores y trabajadores sociales), e investigaciones tecnológicas recientes obre educación temprana

*The monograph **Technology applications related to early childhood** will address early technology interventions for children with special needs, integrated care models that provide technology services and supports holistically, addressing the needs of the child and family in a coordinated way, technology advances in early diagnosis with the collaboration of different professionals (doctors, therapists, educators and social workers), and recent technology research on early education.*

Descriptores/Líneas Temática

- Modelos tecnológicos para la educación temprana
- Guía para padres y madres sobre edad temprana
- Uso de tecnologías digitales para educación temprana
- Educación informática integrada en tecnología para la primera infancia
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- Relación entre los antecedentes de los futuros maestros y el uso de la tecnología en la educación infantil: estudio de caso
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- Aplicación tecnológica para la medición del desarrollo infantil: estudio comparado
- Aplicación tecnológica para la medición del desarrollo infantil: estudio de caso
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