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SUMARIO • SUMMARY • RESUMO

Editorial

In this first issue of 2024 of MLSER, the journal has already reached the number of twelve articles, a challenge for the Editorial Team, which is supported by the large number of manuscripts received, many of them with high quality, which requires their publication in the interest of improving scientific knowledge in different areas of knowledge. This is one of the main purposes of the journal in its contribution to an open science available to all.

A first block of content is dedicated to technologies, an increasingly common reference in the studies carried out to check how they are affecting education. The update of an instrument for the evaluation of virtual learning environments in the European project of inclusive education is addressed in order to measure more accurately the relevance of learning for the learner, the support by the instructor and the learner's autonomy relevance of learning for the learner, instructor support and learner autonomy. On the other hand, the importance of the application and use of social networks in the and use of social networks in the popularization of science aimed at young university students. Its usefulness is to lead to a new approach to address the strategies to be developed by academic journals in those social networks where more young university students are concentrated. Another field of interest is the analysis of digital educational resources that are open to the understanding of natural sciences in rural institutions with secondary education. Specifically, the aim was to determine the improvement of these students when technologies are used as a pedagogical strategy. Finally, the use of mobile devicesfinally, the use of mobile devices as a tool for real-time assessment of learning is analyzed. The the study, addressed to the teaching community, has served to show the previous rejection and a bet on the future of this technology, after a punctual implementation and valorization.

Another block of content includes studies that analyze teaching and competencies. Specifically, we archetypes of active teaching in the perspective of high school students are reviewed. The complexity of the resulting teaching archetypes the resulting teaching archetypes and a theoretical-conceptual scheme in favor of the construction of conditions that favor the school permanence of the youth of the studied entity is conformed. For its part, emotional intelligence is again a field of study, in this case in preschoolers with ADHD preschoolers with ADHD in an educational center in the city of Manta-Manabí-Ecuador. Integral development and work on emotional self-control are used and substantial improvements in the emotional education of these schoolchildren are observed.

Linked to teaching competencies are two studies. In one of them characterizes the same in teachers of primary education in the Dominican Republic. The training needs that emerged as a result of the emergence of COVID-19 were identified the training needs that emerged as a result of the emergence of COVID-19 and that urgently need to be incorporated into teacher training processes were identified, but their technological competence was found to be limited. On the other hand, an analysis is made of the the requirement of soft skills in the field of business administration, marketing and advertising in the strengthening of academic curricula. This study is very different from the rest due to its subject matter and context. Its purpose was to identify and analyze the most in-demand soft skills required by the labor market in these careers. It concludes with the idea of raising the awareness of the authorities to change from the traditional

educational approach to a new role in which the formation of competencies is considered in the new curricula.

Two articles are placed in the context of higher education. One dedicated to test the relationship between student involvement and academic performance in the introductory course of programming for engineering, and the other on project methodologies for teaching in architecture. The first addresses how first-year engineering students engage with the subject of programming and its relationship to academic performance. It concludes with the importance of frequent monitoring of student activity on the platform to encourage engagement from early stages. The second article deals with project development as one of the essential skills to be strengthened in the academic field in the training of architects. The literature is reviewed and the information obtained is processed. The methods used in the research studies are mostly qualitative and focus on methodological, analytical, reflective and pedagogical aspects.

In a different field, the study in which an inclusive multilevel modelis implemented in the area of reading in English within the bilingual system. The interrelationship between the inclusive multilevel model in the English reading class and the academic performance of students without and with some type of educational need is studied. Among the most valuable findings, it is highlighted that all students in the experimental group, without and with SEN, showed a significant increase in academic performance in the different skills involved in English reading with the implementation of the inclusive multilevel model.

This issue of MLSER concludes with an investigation that analyzes the influence of the gender variable on the lexical availability of Chilean primary school students and shows how gender is a variable that does not affect the lexical availability of these students gender is a variable that does not affect the lexical availability of these students.

Antonio Pantoja Vallejo
Editor in chief / Editor in chief / Editor Chefe

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RE-ADAPTATION OF AN INSTRUMENT FOR THE EVALUATION OF VIRTUAL LEARNING ENVIRONMENTS IN THE EUROPEAN INCLUSIVE EDUCATION PROJECT CALLED LOVEDISTANCE

READAPTACIÓN DE UN INSTRUMENTO PARA LA EVALUACIÓN DE ENTORNOS VIRTUALES DE APRENDIZAJE EN EL PROYECTO EUROPEO DE EDUCACIÓN INCLUSIVA DENOMINADO LOVEDISTANCE

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ABSTRACT

This research aimed to re-adapt an instrument for the evaluation of Virtual Learning Environments (VLE), specifically the DELES (Distance Education Learning Environments Survey), for use in the European Inclusive Education Project called LOVEDISTANCE (Learning Optimization and Academic Inclusion Via Equitable Distance Teaching and Learning). The initial assumption is that the instrument may be useful, but it is outdated and not necessarily focused on the objectives of the LOVEDISTANCE project, in particular that of Inclusive Education. An international group of experts in education, information technologies and educational inclusion was convened and a focus group was held to analyze what modifications and changes they would make to the DELES. To process the information obtained, a quantitative-qualitative approach was used, where, in the first instance, the measure of consensus among experts was used to measure the statistical reliability of the experts' responses, and then an analysis of variance (ANOVA) was performed to determine whether there were significant differences between the groups' means; then, a detailed qualitative analysis was made of the observations based on three axes of analysis: considerations of the research exercise, profile of the researchers and analysis of each scale of the instrument. Some

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of the most relevant conclusions were that the instrument is, for the most part, useful for the purposes of the LOVEDISTANCE project, but requires a rewriting that implies, on the one hand, simplifying it by merging some items that are repetitive; and on the other hand, orienting it more towards educational inclusiveness.

RESUMEN

Palabras clave:
entornos virtuales de aprendizaje, instrumentos de evaluación, DELES, LOVEDISTANCE.

Esta investigación tuvo por objetivo re adaptar un instrumento para la evaluación de Entornos Virtuales de Aprendizaje (EVA), específicamente el DELES (Distance Education Learning Environments Survey), para su uso en el Proyecto Europeo de Educación Inclusiva denominado LOVEDISTANCE (Learning Optimization and Academic Inclusion Via Equitative Distance Teaching and Learning). El supuesto inicial es que el instrumento puede ser útil, pero está desactualizado y no necesariamente enfocado a los objetivos del proyecto LOVEDISTANCE, en particular al de Educación Inclusiva. Se convocó a un grupo internacional de expertos en educación, tecnologías de la información e inclusión educativa, y se procedió a hacer un focus group para analizar qué modificaciones y cambios harían al DELES. Para procesar la información obtenida, se usó un enfoque de tipo cuanti-cualitativo, donde se utilizó, en primera instancia, la medida del consenso entre expertos para medir la fiabilidad estadística de las respuestas de los expertos, y después se realizó un análisis de la varianza (ANOVA) para determinar si existían diferencias significativas entre las medias de los grupos; luego, se hizo un análisis cualitativo pormenorizado de las observaciones a partir de tres ejes de análisis: consideraciones del ejercicio investigativo, perfil de los investigadores y análisis de cada escala del instrumento. Algunas de las conclusiones más relevantes fueron que el instrumento es, en su mayoría, útil para los propósitos del proyecto LOVEDISTANCE, pero precisa una re escrita que implica, por un lado, simplificarlo fusionando algunos ítems que son reiterativos; y por el otro, orientarlo más a inclusividad educativa.

Introduction

This article arises within the framework of the European LOVEDISTANCE project, which was funded under the promise of compliance with certain standards and impacts in the educational field, and a very important one has to do with the quality of distance education received by the target groups, so two possible options were considered:

- Create from scratch an instrument for EVA assessment to be used in the LOVEDISTANCE project.
- Use an instrument already validated for the assessment of VAS, which will be used in the LOVEDISTANCE project.

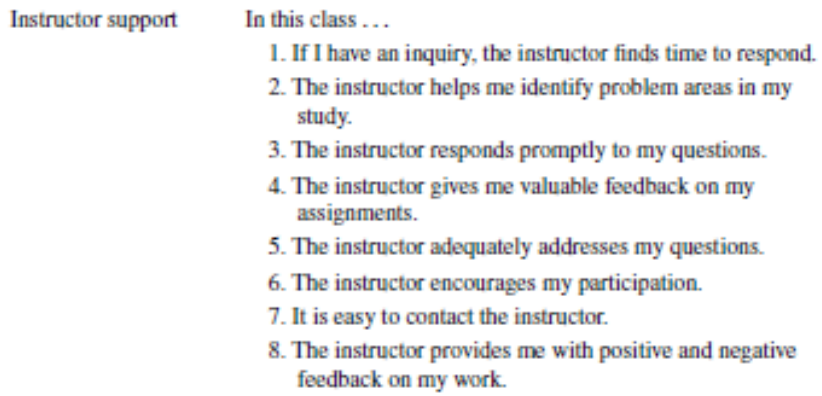
We opted for the latter, i.e., the use of a ready-made and validated instrument due to the particularities of the LOVEDISTANCE project with respect to its Inclusive Education approach and the wide variety of countries and regions targeted, but also as a matter of educational pragmatism in which, through the literature, it was discovered that there were already good precedents. For example, the DELES, developed by Walker and Fraser (2005), which is structured with 34 items in 6 scales; and the WEBLEI, developed by Chang and Fisher (2003), which is structured with 32 items in 4 scales.

The use of both has been validated in multiple researches (Valencia et al., 2014), and although they are among the most used and recognized as useful instruments for the assessment of EVA in the educational dimension pointed out by Salinas (2011), or the one referred to Educational Quality pointed out by Torres and Ortega (2003), the DELES was chosen because it has a broader and more developed scale to assess student attention as shown in Figure 1, which is very important in the LOVEDISTANCE project originally proposed, however, the problems posed by the use of the DELES were synthesized in two aspects:

- Lack of updating: the DELES was created and validated in 2005, since then there have been changes and advances in educational and technological aspects
- The lack of an approach towards inclusive education: and it is believed necessary that EVA has a special orientation towards it.

Figure 1

Instructor support on DELES Scale 1



Instructor support	In this class . . .
	1. If I have an inquiry, the instructor finds time to respond.
	2. The instructor helps me identify problem areas in my study.
	3. The instructor responds promptly to my questions.
	4. The instructor gives me valuable feedback on my assignments.
	5. The instructor adequately addresses my questions.
	6. The instructor encourages my participation.
	7. It is easy to contact the instructor.
	8. The instructor provides me with positive and negative feedback on my work.

Note. The figure represents the first evaluation scale of the DELES, the one on which special emphasis is placed for the purposes of the LOVEDISTANCE project.

Therefore, the objective of this research is to revalidate the DELES for its possible use in the LOVEDISTANCE project, and if necessary, to make the pertinent adaptations and modifications required based on the expert analysis.

The research question posed is as follows: is the EVA assessment tool, DELES, useful and valid in its current form for use in the LOVEDISTANCE project and, if modifications are required, what are they?

LOVEDISTANCE Project

The European project LOVEDISTANCE is funded by the European Union and aims to promote inclusive education in Israel and Georgia by expanding access to higher education for potential and existing students from vulnerable groups, religious and ethnic minorities, refugees, working students and students living in peripheral/distant/rural areas. There are different concepts around the idea of inclusive education, but the one that comes closest to the one proposed by the LOVEDISTANCE project is that of Clavijo and Bautista-Cerro (2020), where they refer that inclusion in the educational environment entails attitudes of deep respect for differences and a responsibility to make them an opportunity for development, participation and learning. The right to education is an unquestionable human right in any modern society. It was established in Art. 26 of the Universal Declaration of Human Rights and developed in many subsequent documents, such as the United Nations International Covenant on Economic, Social and Cultural Rights in 1976, the Convention on the Rights of the Child in 1990, the Millennium Development Goals in 2000 or the Sustainable Development Goals of 2014, among many others.

The main objectives of the LOVEDISTANCE Project are:

- Build capacity in Israel and Georgia to enable their higher education systems to adapt to effective distance learning programs. These capabilities must be related to institutional, staff and student preparedness, as well as to closing knowledge gaps.
- Develop curricula in Israel and Georgia based on distance learning that meet the equity and accessibility requirements of the partner countries' higher education systems to improve the educational integration of disadvantaged students into their educational system (identified target groups).
- Facilitate the accessibility of transfer to teaching and learning materials in electronic format for students in the identified target groups.
- Train and coach faculty members, professional and administrative staff in the design, development, implementation and quality assessment of distance education and e/b-learning courses.
- Raise public awareness about access, equity and democratization of HE to promote social inclusion.

The project aims to provide a holistic view and a solution to develop the total capacity required for the transition from the traditional, frontal model of teaching in higher education institutes to distance learning. Quality standards in higher education now demand the integration of technology into their teaching methods, whether face-to-face, inverted, hybrid or online-only. Special emphasis is placed on pedagogical, technological and educational know-how.

With this set of tools, the project aims to provide the basic skills and competencies that virtual teachers should master, specifically for the target populations, and to promote a training system to achieve this goal.

The project included the design of the framework and infographics for an online course. It can be used by teachers who are developing distance courses with digital contents and resources, using different communication and evaluation tools.

Virtual learning environments (VLE): Concept, characteristics and evaluation

Having clarified the objective and approach of the LOVEDISTANCE project, it is appropriate to discuss EVA and the instrument to be used to assess virtual learning environments, through which inclusive education is delivered to all target groups of the project.

According to Cedeño (2019), an EVA is an educational space hosted on the web, made up of a set of computer tools that enable didactic interaction, which is becoming more and more valid and relevant, but its use was enhanced with the COVID-19 pandemic.

For Belloch (2013), VLEs involve a combination of resources, interactivity, support and structured learning activities, and their main characteristics are:

- Interactivity: the teacher or tutor should not be the protagonist but, on the contrary, the learner should be the main actor
- Flexibility: understood as the set of functionalities that allow the whole system to be easily adapted to the organization where it will be implemented
- Scalability: ability to operate optimally with a small or large number of users
- Standardization: possibility of importing and exporting content in standard formats

This combination of resources implies the implementation of human, pedagogical, technical and technological resources for the optimal functioning of an EVA. In accordance with this idea, Salinas (2011) defines an EVA as having four basic characteristics:

- It is an electronic environment, not material in a physical sense
- It is hosted on the web and can be accessed via the Internet
- Technological support and technical support for troubleshooting are available
- The didactic relationship is not face-to-face

These four characteristics frame two important dimensions in the EVA: the technological and the educational, which are interrelated and enhance each other.

The technological dimension is represented by the tools or computer applications with which the environment is built. These tools serve as support or infrastructure for the development of educational proposals.

The educational dimension of an EVA is represented by the teaching and learning process that takes place within it. This dimension indicates that it is a human and social space, essentially dynamic, based on the interaction generated between the teacher and the students from the planning and resolution of didactic activities. An EVA is presented as an environment to promote learning based on multidirectional communication processes (teacher/student - student/teacher and students among themselves). It is a shared work environment for the construction of knowledge based on the active participation and cooperation of all members of the group.

In relation to the educational dimension, VAS have had a positive impact on the development of students' competencies (Bruffee; however, it is necessary to strengthen the interaction with students and the content feedback process (Romero and Moreira, 2020), therefore the process of continuous improvement, updating and evaluation becomes indispensable.

In order to carry out this process of continuous improvement, updating and evaluation of EVA, Torres and Ortega (2003) propose four areas of analysis:

- Technical quality: referred to the technical characteristics of the platform. It is mostly related to the technological infrastructure, the cost of access and maintenance, the knowledge required for its use, the ease of navigation through the interface, the quality of the security control systems, the versatility for monitoring registrations, cancellations and other eventualities.
- Organizational and creative quality: these are the organizational potentialities for the optimal functioning of the Teaching-Learning process. It is related to flexibility when giving instructions, adaptation to other educational environments, versatility to design and implement help systems for students, availability of design tools, possibility of organizing content at convenience and multimedia integration.
- Communicational quality: the possibility of synchronous and asynchronous communication both with students and with others involved in the Teaching-Learning process. Applies to discussion groups, messaging, message notification, calendaring and conferences
- Didactic quality: possibility of integrating different training strategies that allow the achievement of learning objectives, following the principles of order and clarity, autonomy, active, meaningful and cooperative learning.

Some experiences, such as those of Valencia et al. (2014) are interesting for evaluating VAS in the areas of analysis described by Torres and Ortega (2003), where the design of instruments such as "compliance rubrics" and validation with Likert-type questionnaires is the most widely used quantitative-qualitative option, from the pedagogical perspective, to measure the functionality and performance of the different educational elements that compose them, and that VAS should desirably have. Regarding the subject of rubrics and Likert-type questionnaires, Gottlieb (2006) mentions that they are ideal tools for the evaluation of instruments or techniques used in the educational field, since they represent a scoring guide with specified criteria used to interpret performance objectively, and whose use facilitates correction and feedback (Carrasco, 2007).

In this sense, Cano (2015) conducts a review of Likert-type rubrics and questionnaires as assessment resources in higher education, associating them as an assessment tool according to a vision of competencies, which is the current paradigm of Western educational models, thus concluding that the best way to assess VAS in a general sense are Likert-type rubrics and questionnaires compared to other instruments.

DELES

The Distance Education Learning Environments Survey (DELES) was developed by Walker and Fraser in 2005. The DELES, as shown in Figure 2, has 4 items broken down into 4 scales: (1) Instructor Support; (2) Student Collaboration and Interaction; (3) Personal Relevance; (4) Authentic Learning; (5) Active Learning; and (6) Student Autonomy. The DELES is an online instrument that can be used by students anywhere, eliminates data transfer errors and does not allow for non-response, which increases the overall validity of the instrument. The development of DELES relied heavily on high-quality distance education literature and expert content validation techniques. It treats distance learning as a social and psychological climate distinct from that found in other post-secondary face-to-face settings. Regarding the validity of the DELES, according to analyses of data from a sample of 680 students, the DELES showed strong factorial validity and internal consistency reliability.

Figure 2

Scales and items that make up the DELES

ITEMS IN DISTANCE EDUCATION LEARNING ENVIRONMENTS SURVEY (DELES)

Scale	Items
Instructor support	In this class . . .
	1. If I have an inquiry, the instructor finds time to respond.
	2. The instructor helps me identify problem areas in my study.
	3. The instructor responds promptly to my questions.
	4. The instructor gives me valuable feedback on my assignments.
	5. The instructor adequately addresses my questions.
	6. The instructor encourages my participation.
	7. It is easy to contact the instructor.
	8. The instructor provides me with positive and negative feedback on my work.
Student interaction and collaboration	In this class . . .
	9. I work with others.
	10. I relate my work to others' work.
	11. I share information with other students.
	12. I discuss my ideas with other students.
	13. I collaborate with other students in the class.
	14. Group work is a part of my activities.
Personal relevance	In this class . . .
	15. I can relate what I learn to my life outside of university.
	16. I am able to pursue topics that interest me.
	17. I can connect my studies to my activities outside of class.
	18. I apply my everyday experiences in class.
	19. I link class work to my life outside of university.
	20. I learn things about the world outside of university.
	21. I apply my out-of-class experience.
Authentic learning	In this class . . .
	22. I study real cases related to the class.
	23. I use real facts in class activities.
	24. I work on assignments that deal with real-world information.
	25. I work with real examples.
	26. I enter the real world of the topic of study.
Active learning	In this class . . .
	27. I explore my own strategies for learning.
	28. I seek my own answers.
	29. I solve my own problems.
Student autonomy	In this class . . .
	30. I make decisions about my learning.
	31. I work during times that I find convenient.
	32. I am in control of my learning.
	33. I play an important role in my learning.
	34. I approach learning in my own way.

Response choices are: Always, Often, Sometimes, Seldom, and Never.

Method

Empirical data collection

The research exercise described in this article was conducted within the framework of a transnational working meeting at Levinsky University, Tel Aviv, in April 2022.

The organization of the academic exercise that resulted in modifications to the instruments for evaluating EVA was as follows:

Three teams of 9 members each were formed. The objective of this organization was, on the one hand, to divide the work into smaller and more functional teams, and on the other hand, to form groups in a random and collaborative way. The participants were education experts, leaders and academics from 3 different countries: 13 from Israel, 3

from Portugal and 11 from Georgia. The profile of each of them could belong to one of the following groups:

1. Professor-Researcher expert in Information and Communication Technologies in the educational area
2. Professor-Researcher expert in Higher Education
3. Professor-Researcher expert in Inclusive Education

Likert scale questionnaires were distributed with the following initial assessment criteria.

1. Correction level 1: the item does not require any modification and is in perfect agreement with the scale and the instrument in general
2. Level 2 correctness: the item can improve the wording and syntax, but is relevant within the scale and with the instrument in general
3. Correction level 3: the item must change the sense in which the idea is stated, but it has relevance within the scale and with the instrument in general
4. Correction level 4: the item must be replaced by another, and its relevance within the scale and the instrument in general is questioned
5. Correction level 5: the item should be deleted, should not be replaced and has no relevance.

At the end of the questionnaire, a comments section was also included to make criticisms or suggestions to the instrument in a more qualitative way.

Information processing

The measure of consensus among experts was used, which is defined as consensus as an opinion or position reached by a group of people as general agreement (Tastle & Wierman, 2007). Cronbach's alpha was also used to measure the reliability of the empirical data collection, that is, to assess the extent to which the items of the DELES instrument are correlated. And finally, an ANOVA analysis was performed to see if there were differences between the three groups.

As shown in the equation, consensus is a measure of attraction to a mean value:

$$Cns(X) = 1 + \sum_{i=1}^{n} p_i \cdot log_2\left(1 - \frac{|X_i - \mu_x|}{d_x}\right)$$

where:

- X= list of categories ("1. Insignificant (I)" ... "5. The Most Significant (TMS)").
- p_i= probability of each X.
- d_x= X_{max}-X_{min}.
- X_i=particular element of X.
- μ_x= mean or expected value.

It is, therefore, a measure of dispersion for ordinal data in the interval [0 1] and which, on a Likert scale with gradation between responses, can be transformed into the form of percentage of agreement, as shown in Table 1.

Table 1
Expert Consensus Interpretation

Interval	Consensus classification
$\boldsymbol{Cns(X) \geq 90\%}$	Very strong consensus
$\boldsymbol{80\% \leq Cns(X) < 90\%}$	Strong consensus
$\boldsymbol{60\% \leq Cns(X) < 80\%}$	Moderate consensus
$\boldsymbol{40\% \leq Cns(X) < 60\%}$	Balance
$\boldsymbol{20\% \leq Cns(X) < 40\%}$	Moderate dissent
$\boldsymbol{10\% \leq Cns(X) < 20\%}$	Strong dissent
$\boldsymbol{Cns(X) < 10\%}$	Very strong dissent

Note. Adapted from Wierman & Tastle (2005)

In relation to Cronbach's Alpha, the equation is as follows:

$$\alpha = \frac{K}{K-1}\left(\frac{\sum_{i=1}^{K}\sigma_{Y_i}^2}{\sigma_X^2}\right)$$

where:

- K= number of items
- σ^2_{Yi} = variance of item i
- σ^2_X = variance of the observed scores of the individuals.

The value of Alpha can assume values between 0 and 1. Values close to 1 are better, since they indicate greater internal consistency. By convention and for practical purposes, Alpha values equal to or greater than 0.6 are considered acceptable, greater than 0.8 are good, and greater than 0.9 are excellent. Values below 0.5 and close to 0 indicate that a scale has poor reliability.

Results

Consensus

The application of the consensus formula resulted in the consensuses shown in Table 2. As can be seen, a moderate consensus was obtained in the three groups of experts.

Table 2
Results of the expert consensus

Item	Consensus (%)
Group 1	62 (Moderate)
Group 2	62.5 (Moderate)
Group 3	60.46 (Moderate)
Media	61.66
SD	25.63

Cronbach's Alpha

Result= 0.60

Reliability of the instrument: moderate

Differences between groups of experts

The sum of the individual item ratings for each group of experts is shown in Table 3.

Table 3

Sum of individual ratings for each group of experts

GROUP 1	GROUP 2	GROUP 3
81	76	76
63	81	91
86	78	77
68	79	76
73	72	85
66	67	67
70	88	57
67	78	69
59	84	76

Table ANOVA

The Analysis of Variance resulted in the values shown in Table 4.

Table 4

Analysis of variance table

F.V.	SS	*df*	MS	F	Sig.
Between	274.888	2	137.444	1.966	0.1619
Within	1677.77	24	69.907		
Total	1952.667	26			

Given that 0.1619 >> p=0.05 it is concluded that there are no significant disparities between the groups' means, so the differences between them are attributed to chance.

Discussion and Conclusions

The purpose of this research was to evaluate the use of the DELES instrument for the evaluation of EVA in the distance education project with a focus on inclusion of vulnerable groups called LOVEDISTANCE, as well as to consider its possible redesign and updating. The main findings of this study will be discussed below.

From the results obtained in this research, it can be deduced that the DELES is a suitable evaluation instrument for the LOVEDISTANCE project in its original approach, since the experts' evaluation ratifies that, statistically, it is a useful, valid and pertinent tool; which answers the research question and fulfills the general objective; however, there are qualitative nuances in this interpretation that, next, will be broken down scale by scale.

From the analysis of the results obtained in relation to the first scale of the DELES, i.e., that related to "Instructor Support", it can be affirmed that it is still convenient to

simplify the scale, on the one hand; and on the other, to make an evaluation with a more positive orientation. Regarding positive evaluation, it is believed to be more useful than other types of evaluation, in addition to being more in line with new educational trends and positive psychology (Escudero et al., 2008) but also with the heart of the LOVEDISTANCE Project, whose emphasis lies in accessibility. At this point, some researchers suggested the identification of opportunities for improvement more in the sense of an evaluation by competencies and not so much as a simple signaling of the good and the bad that is being done in the EVA, and in this regard it is relevant what Tobón and Posada (2008) pointed out, which refers that competency-based evaluation is a process of measurement, monitoring and permanent adjustment of the educational teaching process, not only an exchange of performance indicators, where the communicative and qualitative part is also very relevant, especially in the context of excluded groups.

The other point on which there was consensus among researchers on the first DELES scale was the need to simplify it, because it is not necessary to have so many items to determine whether an instructor is doing his or her job correctly or not. Difficulties in obtaining instructor involvement occur regularly and have resulted in different approaches to instructor support (Bianco et al., 2002). Simplification tends to eliminate duplication or confusion in the evaluation (Bruffee, 1993), and it is also a primary requirement to improve the quality of an instrument when it is being readapted, as is the case of the DELES.

Regarding the second scale of the DELES, i.e., that related to "student interaction and collaboration", the results suggest a simplification of this section in the instrument, and at the same time, to give a more important relative weight to maintaining a constant interaction with marginalized groups in the educational context. The virtual teacher has been characterized by creating new learning practices, where knowledge emerges through interaction, accompaniment, as well as the feedback of activities and resources integrated in virtual training for the achievement of the proposed objectives, that is, in virtual learning environments, the virtual teacher is part of an interdisciplinary team that contributes to the development of environments in accordance with the demands of the knowledge and information society (Coll & Monereo, 2008). According to Bruffe (1993), collaboration occurs when students work together in groups to create knowledge, but also work together with the teacher and transfer the nature of authority to the group. Therefore, a condition for collaboration is the teacher's ability to delegate authority and the students' ability to grant authority to each other for their own learning processes. This is an interactive process in which it is primarily the teacher's responsibility to delegate authority to the group and to promote effective interaction among group members (Forslund & Hammar, 2014).

The third scale is "personal relevance," which expresses students' interest and ability in terms of using a synchronized and asynchronized e-learning environment (Ozkok, 2020). A feature of the learning environment that emphasizes concrete and personally relevant experiences to help the learner construct individual meaning (Kwak et al., 2015). The results of this scale point to the rethinking of the items, since it is unfeasible to evaluate something that cannot be known so soon, and that is rather known in the practice of knowledge. It is not their relevance that is being questioned, but rather the formulation of the questions and their scope. Some findings made from the feedback obtained in the research exercise show that, although the study is important in the life of any person to obtain adequate and useful knowledge for individual, social and labor market needs, measuring its impact during the course of the same studies is difficult because it is not possible to appreciate a great quantitative-qualitative improvement in

the short term. Therefore, it would be desirable to either simplify the scale or rethink it in terms of something more long-term.

In the next item, the instrument refers to authentic learning, and the results guide towards a simplification of the scale into one or two questions, but also highlight the importance of assessing authentic learning, which can be defined as a learning style rooted in situation cognition and problem-based learning (Ke & Kwak, 2013) that involves the learner pursuing activities that involve real or genuine information or scenarios (Kwak et al., 2015). Authentic learning typically focuses on complex real-world problems and their solutions using role-playing exercises, problem-based activities, case studies and participation in virtual communities of practice. Learning environments are inherently multidisciplinary." (Lombardi, 2007).

The findings suggest that the use of real-life case studies are the most highly rated by students and perhaps have the highest impact in terms of meaningful learning. The case study technique consists precisely in providing a series of cases that represent different real-life problem situations to be studied and analyzed. In this way, the aim is to train students in the generation of solutions (Coraggio & Vispo, 2001). Obviously, since this is an active pedagogical method, some minimum conditions are required. For example, some previous assumptions in the teacher: creativity, active methodology, concern for an integral formation, group management skills, good communication with the students and a defined teaching vocation. It must also be recognized that the method is better handled in small groups. Specifically, a case is a written account that describes a situation that occurred in the life of a person, family, group or company. Its application as a learning strategy or technique, as previously mentioned, trains students in the elaboration of valid solutions for possible complex problems that may arise in the future. In this sense, the case teaches how to live in society. And this makes it particularly important (Martínez Sánchez, 1999).

The penultimate scale of the DELES has to do with "active learning", and the results confirm that this aspect is absolutely relevant for distance education, because if it does not exist, the risk of failure is high and that of learning is null, with the difference that there can be no punctual follow-up in comparison with the face-to-face environment. Meaningful learning can be anything related to the course that all students in a class session called upon to do more than simply watch, listen, and take notes" (Felder & Brent, 2009), i.e., a learning construct that engages students to actively engage with content to construct knowledge (Prince, n.d.).

Some findings suggest that this scale could be expanded and leveled with the rest. The extension of this scale, also called "self-learning", could measure, among other things, how much the VAS facilitates the student to find the ideal space and time for study, to dedicate a fixed schedule to study and organize activities, to maintain motivation to complete the course being taken, to minimize distractions and to take some rest. Then, the challenge for this scale, according to the findings, is to modify the current items or draft new ones that go along the lines of measuring the ability of an individual to forge his own education in a self-taught manner, understood as a learning model configured by oneself to nourish oneself with all the information available to him (López, J. V. B et al., 2015)

To conclude the analysis of the scales, there remains that related to student autonomy, which can be defined as the level of student control over the planning, execution and evaluation of their own courses (Moore & Kearsley, n.d.). Autonomy in the case of distance education plays a key role as it is a key competence that, if developed, can achieve optimal student achievement, according to the results of the research. The findings show that this scale is generally positively valued and that it does not require

major modifications, only some improvements or specifications regarding the possibility of the student to redirect his own learning process supported by criteria of autonomy, which, in the educational context, is intentional, conscious, explicit and analytical. Its exercise implies the determination of the learner to be responsible and to make personal decisions about his/her learning, as well as the willingness to participate, together with the teacher, in the negotiation of the following aspects: the identification of his/her own learning needs and the definition of his/her objectives; the planning of classes; the selection of contents and the establishment of their sequencing; the selection of appropriate didactic materials; the training in the use of various techniques and strategies, but especially learning and metacognitive ones (Rodríguez González, 2006).

In synthesis, the improvements to the instrument can be summarized as follows: for the first scale -instructor support-, merging questions that are repetitive and orienting it towards a more positive evaluation; for the second scale -student interaction and collaboration-, giving greater weight to contact with marginalized groups and simplifying the entire scale; in the third -personal relevance-, a rewriting of some repetitive items and orientation of others towards the long term is proposed; in the fourth -authentic learning-, rethink some items towards the deepening of learning; in the fifth -active learning- expand the scale to level it with the rest; and finally, the sixth scale -student autonomy- does not require major modifications.

Final considerations

No VAS assessment tool is definitive and immutable. In fact, most of them have multiple areas for improvement and opportunity, as demonstrated in the research exercise carried out. The initial assumption was that observations would be minimal for the DELES, however, there were significant corrections.

Although the statistical validation was correct and positive in the sense of reaffirming the hypothesis, the relevant observations and findings were obtained through the qualitative analysis of the information, which, thanks to the full willingness and collaboration of the researchers for the academic exercise, was fundamental for obtaining detailed and valuable information.

Instruments must change as VAS and educational trends evolve. Considering that the instrument in question was evaluated in 2005 -more than 15 years ago- and that technological and educational progress has been considerable since then, this would partially explain the number of observations and corrections, especially those referring to the meaning of the instrument, not to grammatical or structural ones.

The limitations of the study were, if anything, those related to time, because there was a time limit of one day for the activity according to the agenda of the meeting, and perhaps the in-depth discussion could have taken a little more time.

Although it is true that the instructions were clear regarding the execution of the dynamics and it was programmed in the initial calendar, the activity was carried out at the end of an intense day of work, which undoubtedly influenced the spirit and dedication of some researchers in this regard.

The potential number of students involved in the evaluation amounts to more than 10 thousand, and the significance of not doing so implies offering an educational service without adequate quality controls and, therefore, not being able to improve according to valid criteria.

This exercise can serve as a precedent for timely consideration for the revalidation of instruments that have already been validated, especially those that, given their characteristics, require updating and improvement. In the future, it is likely that learning environments may continue to evolve (Belloch, 2013), which is why it is not ruled out

that, according to trends and updates in education and educational technology, the DELES may be re-evaluated.

As future lines of research, we visualize ideas such as validation of other instruments in the educational field or their creation and validation for the European project LOVEDISTANCE, which has an important educational challenge and the way to measure quality will be through qualitative-quantitative indicators associated with the fulfillment of previously defined goals and objectives.

Finally, it can be said that this was not a definitive or conclusive exercise, since this type of dynamics is necessary when the technological circumstances change, the educational approach or when some variable of the educational process has sufficient influence to disrupt the teaching-learning process of students in a context of social exclusion.

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THE IMPORTANCE OF THE APPLICATION AND USE OF SOCIAL NETWORKS IN THE POPULARIZATION OF SCIENCE AIMED AT YOUNG UNIVERSITY STUDENTS

LA IMPORTANCIA DE LA APLICACIÓN Y USO DE LAS REDES SOCIALES EN LA DIVULGACIÓN CIENTÍFICA DIRIGIDA A JÓVENES UNIVERSITARIOS

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ABSTRACT

The aim of this research is to show the importance of exploring and applying new ways or channels of dissemination in accordance with current needs and demands, in order to reach a young audience in terms of dissemination and scientific knowledge. For this reason, this study aims to demonstrate not only the effectiveness, but also the value that young university students give to social networks as one of the main channels for consulting information. To this end, a survey was carried out among 188 students from fourteen university degrees to find out and assess the reasons for their lack of interest in reading and consulting scientific journals and publications. In this sense, one of the problems facing Spanish science popularisation is the lack of existing and applicable means of dissemination, especially if one wishes to reach a young audience. In this way, it underlines the idea that social networks can be a potential channel for the dissemination and wider reach of scientific knowledge in any area. For all these reasons, the present study would lead to a new approach which would allow to address the strategies to be developed by academic journals in those social networks where more young university students are concentrated.

Palabras clave:

RESUMEN

La presente investigación tiene como objetivo, mostrar la importancia de explorar y aplicar nuevas vías o canales de difusión acordes a las necesidades y demandas actuales, para llegar a un público joven en materia de divulgación y conocimiento científico.

redes sociales, divulgación científica, universitarios, ciencia, revistas académicas	Es por ello, que a través de este estudio se pretende evidenciar no solo la eficacia, sino también, el valor que los jóvenes universitarios dan a las redes sociales como uno de los principales canales de consulta de información. Para ello, se ha realizado una encuesta a 188 estudiantes de catorce grados universitarios a través de la cual, se ha podido conocer y valorar los motivos de su escaso interés en la lectura y consulta de revistas y publicaciones científicas. Observando en este sentido, cómo uno de los problemas a los que se enfrenta la divulgación científica española es la falta de medios de difusión existentes y aplicables, especialmente si se desea llegar a un público joven. De este modo, se subraya la idea de que las redes sociales pueden ser un canal potencial para la difusión y mayor alcance del conocimiento científico en cualquier área. Por todo ello, el presente estudio llevaría a un nuevo planteamiento el cual permita abordar las estrategias a desarrollar por parte de las revistas académicas en aquellas redes sociales donde se concentran más jóvenes universitarios.

Introduction

The hypothesis that articulates this article is based on whether the importance and power that social networks have as communication channels is really useful for scientific dissemination, especially if we want to reach a young audience such as Spanish university students. It is understood that the use of these, favors a greater reach and new ways of dissemination without forgetting the consideration and role of the traditional media.

The study or review on the perception of students in relation to scientific and popularization matters is not something new. Several investigations have previously addressed this problem, such as, for example, the consultation carried out by the University of Oviedo between 2010 and 2011 to 161 students in order to know their impression of scientific dissemination in the press and its contribution to scientific culture, obtaining as a result that:

> "All groups agreed on the low scientific culture of Spaniards; 61.29% attributed it to poor scientific dissemination, while the remaining 38.71% considered that dissemination is adequate, there is sufficient information in newspapers and in an appreciable number of magazines, in addition to television and the Internet" (Cantabrana et al., 2015, p.47)

As well as, the report conducted in seven faculties of the National University of Pilar (Paraguay) in 2017 in order to measure both the perception, as well as attitudes towards scientific research through a sample of 358 participants, which highlights:

> Weaknesses in the development of students' abilities to present projects in calls for proposals; scarce participation in scientific dissemination events; little use of scientific articles by professors in their lectures; as well as the need for greater emphasis on the teaching of the scientific method. At the institutional level, there is a lack of promotion of research departments and, above all, of linking research activities with students. (Ortega, 2018, p.108).

Similarly, interesting scientific publications related to this topic have been found and consulted (Berrios Aguayo et al. 2020). These, together with institutional reports such as the Spanish University System Facts and Figures report on the 2021-2022 academic year or those published by the Spanish Foundation for Science and Technology (FECYT), have made it possible to put the figures surrounding the academic world on the table in order to create an approach that links science with young people.

For example, according to the annual report of the Spanish University System (SUE) for the 2020-2021 academic year, the university network is composed of the following figures: 84 universities are in operation, of which 50 are public and 34 are private, resulting in 1,067 university centers between schools and faculties, 544 university research institutes, 52 doctoral schools, 56 university hospitals and 77 foundations, and 3,062 undergraduate degrees, resulting in 1,679,518 enrolled students between Bachelor's and Master's degrees.

Statistics suggest that young college students are interested in their own education and in academia. In this work, our objective is to discover, in addition to their perception of science and science popularization, the value of the use of social networks as a means of dissemination, making reference to social networks such as YouTube, Instagram or TikTok.

Undoubtedly, science plays an important role in today's society because it allows and enables the creation of a more prepared and knowledgeable society in different areas through research and dissemination. Furthermore, it is defined as a "rational, systematic,

accurate, verifiable and, therefore, fallible knowledge" (Bunge, 2018, p. 7), and provides a broader understanding of the universe and the world around us.

All the factors or processes that contribute to its creation are essential for the achievement of specific objectives and results due to this purpose. This research aims to demonstrate the relevance of investigating and implementing new forms of dissemination adapted to current demands, such as social networks, to reach a young audience and understand their perception of scientific publications and journals. Thus, Voytek (2017) states that social networks "in addition to their use as a communication tool between scientists and the public and media, are research tools that scientists are leveraging for their research" (p.1220).

Likewise, and in relation to the importance of digital applications for young university students, it is worth mentioning the concept of *open science*, understood as the paradigm of doing science by betting on the creation, dissemination and storage of research in a public way. Méndez (2021) provides the following definition to this term of open science: "is the expression with which we designate the practice of sharing the knowledge resulting from publicly funded research in a completely open, free and unrestricted way" (p.2). Likewise, and expanding on the definition provided on the web page, *research* section, of the University of Castilla La-Mancha:

> It is a movement promoted by the OECD countries and encouraged by the European Commission, which advocates free access by citizens to the results of scientific research, data, resources, results, thoughts, as well as the results and discoveries of scientific research to be universally accessible and without restrictions.

In addition, in 2016 the European Commission's Directorate-General for Research and Innovation published the document *Open Innovation, Open Science, Open to the World*, which provides an answer to the "three O's" and which if translated into Spanish would give rise to the "three A's" open innovation, open science and openness to the world. The purpose of the book was to mark the route of the different actions that allow science and innovation access to scientific publications, the possibility of collaborations between different researchers, as well as their training, which implies changes in the technological and scientific infrastructures of the traditional system. And for all of the above, the purpose of information science is:

> To create conditions to gather institutionalized information and distribute it in an appropriate way to a public that, judging its importance, will value it in order to use it for the development of the individual and the spaces he/she inhabits. (de Alburquerque, 2001, p.24)

Scientific dissemination

Regarding scientific dissemination, we recover a simple and clear definition given by Belenguer (2003) in which the author defines the term dissemination as "the diffusion or extension of something in a way that is accessible and intelligible to the population" (p.45). However, as a more academic definition, it is necessary to cite the one issued by F. De Lionnais in the debate held at the Association of Science Writers in 1958, and to which Belenguer also refers:

> What we understand by Scientific Dissemination is precisely this: any activity of explanation and dissemination of knowledge, culture and scientific and technical thought, under two conditions, with two reservations: the first is that these explanations and this dissemination of scientific and technical thought be made outside the official education or equivalent teachings... The second

> reservation is that these extracurricular explanations are not intended to train specialists, nor to perfect them in their own specialty, since, on the contrary, we claim to complete the culture of specialists outside their specialty. (Quoted in Belenguer, 2003, p.46).

With both definitions we understand that outreach, in this case scientific, has as its premise to reach everyone equally, regardless of socioeconomic and educational level, so that scientific production is not framed within the same scenario as the academic for the benefit of a few. Along the same lines, Fundora and García (2021) understand science popularization as "bringing science closer to the general, non-specialized public; it is any activity of explanation and dissemination of knowledge, culture and scientific and technical thought" (p.92). For their part, Massarani and Moreira (2004) in their article on *Popularization of science: historical perspectives and permanent dilemmas*, claim that "the popularization of science must be included in a sufficiently broad collective process, involving research institutions, universities, governments, as well as the actors that weave these threads: scientists, communicators, journalists, researchers and students" (p.35). In addition, other authors have stated the following:

> The media focused on the popularization of science must also respond to this set of transformations introduced by Web 2.0 that affect the design, production and distribution of content. This aspect is affected by the growth of interest in science that has occurred exponentially over the last few years, from 6.9% in 2004 to 16% in 2016 (Calvo et al., 2018, pp. 294-295).

Society's growing interest in science in recent years has led many scientific journals to reinvent themselves:

> The interest shown by Spanish citizens in science and technology has been increasing over the last ten years. According to the 2019 Annual Biotechnology Report of the Spanish Association of Biocompanies (AseBio), interest in science and technology grew over the last decade to 16.3% in 2018. This means that one out of every six people spontaneously expresses interest in scientific and technological topics. (Cebrián, 2020, para.1)

Along the same lines, at the national level, the Spanish Foundation for Science and Technology (FECYT) conducted in 2020 the *10th Survey of Social Perception of Science* , which involved the participation of eight thousand surveys throughout the country, from which we extract the following result:

> A large majority believe that more should be invested in science and technology at all levels of public administration and private companies. This demand is greater towards the Government of Spain, supported by 85% of the population. 80% believe that regional governments should increase investment in science and technology research, along with 71% who believe that local administrations and private companies should do so. (FECYT, 2020, p.4).

In 2021, the FECYT Foundation created the *Ranking of Visibility and Impact of Spanish Scientific Journals in the Humanities and Social Sciences*. Of the 518 journals submitted, 514 renewed the FECYT Quality Seal and were divided into one or two thematic categories. Comunicar magazine, which focuses on communication and education, received the highest rating. It stands out for publishing quarterly articles in English and Spanish, with summaries in several languages, and its presence in social networks such as Facebook, Twitter and LinkedIn increases its dissemination and impact. The journal is internationally recognized as a leader in its field and has demonstrated its

successful scientific dissemination through a variety of channels, including social networks.

Similarly, the quality of publications in scientific journals should be taken into account. Therefore, according to Leotau (2006), the impact factor is the most common tool used at the international level to determine their condition. It is an instrument applied by the most relevant databases and by the entire research sector for the publication of papers (p.6).

Scientific journals

Scientific journals face challenges in the dissemination and diffusion of research, and it is important to consider the audience. Scientific dissemination guarantees the presence of knowledge and culture in society, while diffusion allows them to be understood and accepted, opening the door to future research (Ramírez et al., 2012). Additional efforts must be made to expand knowledge and transmit information to a society interested in learning and knowing its environment. Scientific journals are seen as a "medium that allows scientific communication and as a mechanism to assist in the quality control of research inputs, in order to strengthen technological developments and innovation processes" (Ramírez et al., 2012, p.49).

It is interesting to mention the origin of scientific journals before continuing with the present work, situating the interest in science and new fields of research, starting in the second half of the 17th century.

The new way of creating knowledge was adopted by scientific societies created outside the universities, because in the official education system of the time, the academic structures still dated back to the medieval period and their organization did not allow the implementation of the new experimental methods.

The societies began as associations that grouped people interested in certain topics and when they accumulated associates and reached a certain solidity, they became officially recognized national scientific academies. (Mendoza and Paravic, 2006)

This group of intellectuals sought to transmit knowledge in an easier way than that presented in the books of the time. However, the demand for this work of adapting the knowledge made it impossible to carry out the task in its entirety, which is why we resorted to the elaboration of fragments that anticipated, as a summary, the treatise of the work under the publication of journals. "The first scientific journals were the *Journal de Sçavans* in France and the *Philosophical Transactions of the Royal Society*, in London" (Mendoza and Paravic, 2006, p.53). Thus, a scientific correspondence was generated between London and Paris and was known as *Republique des Lettres*:

> In 1622 the *Royal Society* was founded in London and the *Académie Royale des Science* , now called *Académie des Science*, in France. To disseminate their discoveries, they adopted the trusted mail system that was being practiced in several European courts to exchange diplomatic correspondence. Thus, communication between researchers was streamlined, and along with the intellectual content of each letter, scientists gradually began to add comments, evaluations and judgments, which formed a method of critical expression of new discoveries. (Mendoza and Paravic, 2006, p.53)

On the other hand, and moving forward in time, de Alburquerque (2001) refers to both the structure and the transition that popular science journals have undergone in relation to the changes established in the field of communication after the irruption of new technologies:

> From the transition from a written to an electronic modality, a mutation that today, in terms of making science public, has meant that scientific journals have been forced to move from a written communication, typical of a typographic culture, to a cybernetic communication, typical of an electronic culture (Cited by Mendoza and Paravic, 2006, p.51)

Social networks as a means of communication

To better understand their role as a means of communication and information dissemination, social networks can be divided into two groups. In the first group are organizations that focus on scientific and academic outreach. The second group includes the rest of the social networks, such as Facebook, YouTube, Instagram and TikTok, which have broader objectives and focus on different targets depending on their structure.

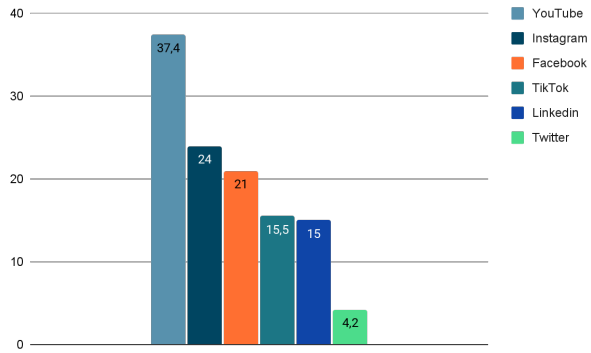
In an article published on the Inter-American Development Bank blog, Dr. Antonio Moneo (2014) highlighted three specialized applications: Mendeley, Academia.edu and ResearchGate. Platforms dedicated to the exchange of scientific data are gaining popularity in other social networks that function as online communities where users with academic profiles share and interact with other researchers. Campos-Freire and Rúas-Araújo (2016) also mentioned the role of scientific social networks as interaction platforms and mentioned examples such as LinkedIn, Academia.edu, ResearchGate, Scilink and Nature Network, as well as how these digital networks change the dynamics of scientific communication by accelerating the knowledge feedback loop.

Social networks offer several advantages for academia. They allow the creation of working groups among researchers, who can present their publications and academic training in their professional profiles. They also facilitate the dissemination of updated information on seminars, conferences, publications, job offers and other relevant news. These networks are connected to search engines, which use metrics to evaluate authors and publications. According to Roig-Vila et al. (2010), social networks are scientific communities that use participatory and communicative technologies to exchange information, and the Internet enhances relationships between specialists and promotes the development of their research activities.

In the same vein, another platform is worth mentioning: *InfluScience*, a space born through a project submitted in the 2019 call for the National Plan funded by the State Research Agency of the Spanish Ministry of Science and Innovation, with the aim of publicizing and visualizing scientists, whose work has managed to achieve a strong presence in social media between 2016 and 2020. According to the data provided, the profiles of 4,209 people and 4,697 scientific articles disseminated through social networks are established, with articles related to the medical area having the greatest impact through these channels.

The second group of the ranking, and attending to the number of users, we find YouTube (2005), Facebook (2004) and Instagram (2010), followed by TikTok (2016), LinkedIn (2002) and Twitter (2006). Figure 1 below shows the number of users of the main social networks in Spain, with YouTube leading the *ranking* with 37.4 million users, followed by Instagram's 24 million.

Figure 1
Ranking of social networks in Spain



Note. The graph shows the number of users of the 6 main social networks in Spain. Own elaboration. november 18, 2022. Source: https://unavidaonline.com/estadisticas-redes-sociales/#ranking españa

Social networks are mass communication channels that allow people with profiles on these platforms to share information, opinions and thoughts. These networks stand out for the interaction among users, constant updating and immediacy. Likewise, they are defined by the Pan-Hispanic Dictionary of Legal Spanish (2022) as:

> An information society service that offers users a communication platform through the Internet so that they can generate a profile with their personal data, facilitating the creation of communities based on common criteria and allowing the communication of its users, so that they can interact through messages, share information, images or videos, allowing these publications to be immediately accessible by all the users of their group.

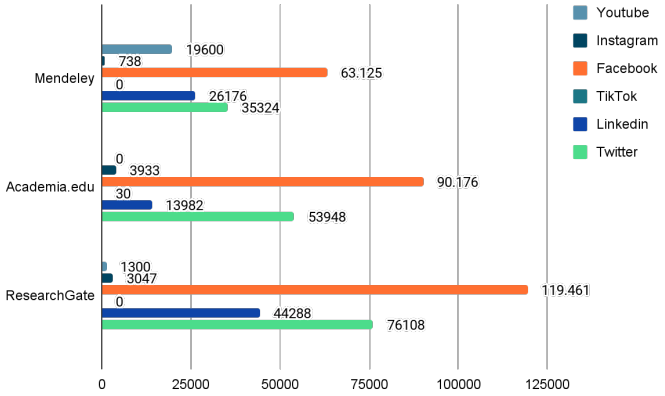
According to the latest *Digital 2022 global* report by We Are Social and Hootsuite (2022) the number of registered users on social networks is equivalent to more than 58% of the world's population. Therefore, it is a mistake to consider that social networks are used exclusively by a young audience, since the study sample includes people aged between 16 and 64 years old. Data from this report also revealed a growth of more than 10% in global social network users with 424 million new users starting to use social networks during the past year.

The scientific community has recognized social networks as a new way to communicate, collaborate and share information. As predicted by Nassi-Caló (2015), a significant increase in the use of social networks in scientific communication has been observed in recent years, with the creation of specific platforms for interaction and information exchange among researchers. Frias (2014) also emphasizes the importance of researchers being present in social networks because they have spread to various sectors and fields, allowing them to reach a larger number of people to disseminate their research.

Figure 2 below shows the presence of these academic networks on the main social platforms such as Facebook, YouTube and Instagram.

Figure 2

Number of users hosted by Mendeley, Academia.edu and ReseachGate in the six main social networks.



Note. Data obtained from official profiles, November 18, 2022.

In this sense, de la Piedra and Meana (2018) stated years ago that "social networks serve the purpose of reducing communicative limitations and you end up developing apparently close relationships with people who are not; a subjective impression" (p.453).

In parallel to this we must take into account the data collected through the latest survey of *Social Perception of Science and Technology in Spain* conducted by FECYT (2020) on the relationship between science, technology and society. As can be seen in Figure 3, 61.4% are informed about science and technology topics through the Internet (digital press, social networks and other websites) compared to 14.5% who do so through popular science or technical magazines. These data reaffirm the importance of scientific dissemination through these channels.

Figure 3

Responses for the Science and technology and media survey.

A CONTINUACIÓN VOY A LEERLE DISTINTOS MEDIOS DE COMUNICACIÓN. NOS GUSTARÍA SABER A TRAVÉS DE QUÉ MEDIOS SE INFORMA UD. SOBRE TEMAS DE CIENCIA Y TECNOLOGÍA (P.10.B1)
POR SEXO Y EDAD

	TOTAL	SEXO		EDAD					
		Hombre	Mujer	De 15 a 24 años	De 25 a 34 años	De 35 a 44 años	De 45 a 54 años	De 55 a 64 años	De 65 y más años
Internet (prensa digital, redes sociales y otras webs)	61,4%	62,9%	60,2%	79,6%	78,4%	77,9%	65,7%	53,6%	25,0%
Libros	15,8%	15,6%	15,9%	16,3%	18,5%	15,6%	15,4%	15,4%	14,4%
Prensa escrita en papel	34,4%	38,1%	31,2%	27,0%	26,9%	25,6%	31,9%	40,5%	50,0%
Radio	41,0%	44,3%	38,1%	30,6%	36,3%	38,3%	39,6%	44,2%	51,9%
Revistas de divulgación científica o técnica	14,5%	13,6%	15,3%	16,1%	16,6%	17,4%	14,0%	16,0%	8,8%
Revistas semanales de información general	13,1%	11,5%	14,4%	12,0%	13,0%	10,1%	13,4%	13,6%	15,9%
Televisión	72,0%	69,7%	74,0%	78,1%	68,2%	65,0%	76,1%	68,8%	76,3%
Otros	2,4%	1,7%	3,0%	2,8%	1,7%	2,5%	2,3%	1,0%	3,8%
Ninguno	1,9%	1,1%	2,5%	1,5%	0,2%	2,6%	2,6%	3,5%	0,5%
No sabe	2,2%	2,5%	2,1%	1,1%	2,1%	2,1%	2,7%	3,4%	1,8%

% Porcentajes más destacados en sentido horizontal
% Porcentajes menos destacados en sentido horizontal

Note: The results shown in the table answer the question: *Next, I am going to read you different media, we would like to know through which media you are informed about science and technology issues*. The Social Perception of Science and Technology in Spain report conducted by FECYT was prepared in 2019 and published in 2020. (p.160). Source: www.fecyt.es

Methodology

One of the main problems faced by science popularization is the lack of channels that help the understanding of scientific information that explains the reality around us (Vivas et al., 2017) and, especially, to a young audience. In this sense, this research aims to show the importance of exploring and applying new ways or channels of dissemination according to the current needs and demands, to reach a young audience in terms of popularization and scientific knowledge.

Based on the various primary data collection methods proposed by Torres et al. (2019) for the design of a survey in a scientific research proceeded to the development of a questionnaire to determine the importance of the application and use of social networks in science outreach aimed at young university students.

Following Torres et al. (2019), for the design of this survey, firstly, the object of the survey was defined, secondly, the questionnaire was formulated to obtain the data, and finally, the analysis was carried out.

It is, therefore, a descriptive method that offers the possibility of detecting needs, habits and other aspects that will give way to solid research (Torres et al., 2019, p.4).

The survey was conducted in person with a total of 188 undergraduate students at the Universidad Europea del Atlántico, located in Santander, Spain. A Google Forms form was used so that students could access via a QR code sent to their institutional email, which ensured the reliability of the responses and the thoroughness of the results. The data were collected guaranteeing the anonymity of the participants by answering 14 mandatory questions organized in two blocks. A first block with four questions referring to sex, age, degree and current academic year; and a second block of ten questions referring to consultation and contact with academic journals.

Once the correspondence between scientific dissemination and social networks has been contextualized in data and in a general way, the questions that make up the questionnaire are presented, which has been developed as an approach that allows us to know the situation of young university students in relation to scientific dissemination.

1. Sex:
    - ❑ Man
    - ❑ Woman
    - ❑ I prefer not to say
2. Age:
    - ❑ Between 18 and 20
    - ❑ Between 20 and 22
    - ❑ Between 22 and 25
    - ❑ More than 25
3. Grade Studied:
4. Course you are in:
5. Have you ever turned to scientific journals for information?
    - ❑ Yes
    - ❑ No

6. What is the main reason you come to your practice?
    - ❑ Academic subject
    - ❑ Interest
    - ❑ Other:
7. what is the main reason you come to your practice?

- ❑ None
- ❑ Between one and two
- ❑ Between three and four
- ❑ More than four

8. What is your opinion on science popularization?
9. Do you obtain scientific information on social networks?
    - ❑ Yes
    - ❑ No
10. which social network do you use the most?
    - ❑ Instagram
    - ❑ Facebook
    - ❑ Twitter
    - ❑ LinkedIn
    - ❑ Other:
11. Do you consider it necessary to popularize science in social networks?
    - ❑ Yes
    - ❑ No
12. What is your opinion on the dissemination channels of scientific journals?
13. What do you think is the main problem with scientific journals?
14. Do you think that popularizing science in social networks would increase the interest of the younger public?
    - ❑ Yes
    - ❑ No

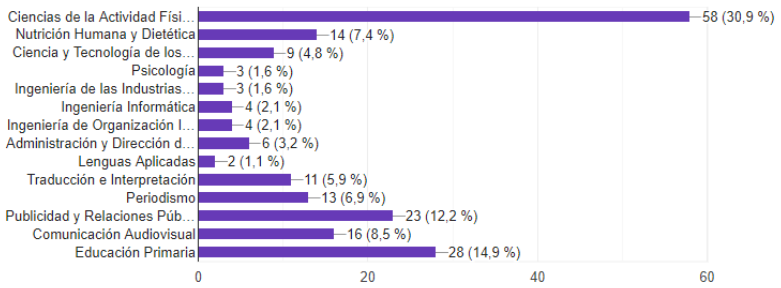
Results

The following are the participation results of the university students who completed the survey. This section is divided into two parts: the first part corresponds to questions that have been elaborated with the objective of knowing more in depth the characteristics of the sample, while the second part of the questions has been focused on knowing the perception of this public on the proposed topic.

Of the total 188 students, 54.3% were male, 42.6% were female and 3.7% preferred not to say. In terms of the age of the sample under study, the 20 to 22 age range is the highest (47.9%), in second place, the 18 to 20 age range (41.5%), followed by the 22 to 25 age range (11.7%) and in last place are those over 25 (3.2%). Another of the questions included referred to the degree that students at the European University of the Atlantic are currently pursuing. The results obtained, see **Figure 4**, reveal a high participation of students from the degree in Physical Activity and Sports Sciences (30.9%), followed by the degree in Primary Education (14.9%), Advertising and Public Relations (12.2%), Audiovisual Communication (8.5%), Human Nutrition and Dietetics (7.4%), Journalism (6.9%), Translation and Interpreting (5.9%), Food Science and Technology (4.8%), Business Administration and Management (3.2%), Computer Engineering (2.1%), Industrial Organization Engineering (2.1%), Psychology (1.6%), Agricultural and Food Industries Engineering (1.6%) and Applied Languages (1.1%). In relation to the year in which the students who completed the questionnaire were in, most of the participants were from higher years: fourth year (33%), third year (28.7%), second year (23.4%) and, lastly, first year students (16%).

Figure 4

Result of the grade level of the respondents.



Once this was raised, the second part of the questions focused on the students' appreciation of the proposed topic: the role of social networks in the scientific field. Therefore, in the questionnaire, reference was made to whether students have ever resorted to scientific journals to obtain information on a given topic. In this regard, 84% have done so, compared to 17.6% who have not. In this regard, the main reason for consultation by this group has also been ascertained. Bearing in mind that we are talking about undergraduate students, the main reason is for an academic matter (82.4%), followed by a matter of interest (22.3%) and, finally, 9.6% have resorted to this source for another reason.

The next question reveals striking data on the number of scientific journals students are familiar with. A 37.8% only know one, 29.8% two, followed by 17.6% for the option of three, 4.9% responded that four and more than four, 14.9%. Thus, it is possible to appreciate the existence of a certain lack of knowledge regarding this type of media on the part of young university students.

It has also been possible to know, through an open-ended question, the opinion of these students on science popularization as such. Despite the fact that this audience does not know many magazines of this type, of the 188 respondents, 155 have a good perception of science popularization, classifying it as: "necessary", "important", "useful" and contributes to learning.

However, 17 responses were collected referring to the "need to introduce a new point of view", to the claim of free content and to the need to promote it massively. "Their repercussion, they should do something to promote themselves more and reach more people", important considerations, since it is precisely on these last issues that the project is based. On the other hand, 16 people preferred not to answer due to lack of knowledge on the subject.

Bearing in mind that the development of this work is based on the importance of the application and use of social networks in scientific dissemination aimed at young university students, 71.3% acknowledged that they usually obtain scientific information through social networks, compared to 29.3% who did not.

As for the social networks most used by this *target*, Instagram is in the lead (68.1%), Twitter (12.2%), YouTube (10.1%), Facebook (4.8%), TikTok (1.6%) followed by Twitch, WhatsApp and LinkedIn (0.5%). Some data to take into account when developing the strategy for the dissemination of content on social networks for university audiences. Along the same lines, 96.3% believe that dissemination in social networks is necessary, compared to only 3.7% who do not.

On the other hand, with regard to the question *"What is your opinion about the dissemination channels of scientific journals?* It is noteworthy that despite its open-ended

nature, the answers are repeated. Thus, 19.14% believe that the dissemination channels of scientific journals face problems of advertising, *marketing* and promotion; for 17.55% this type of channels are boring and therefore are not attractive to the public; 14.89% consider that the main problem is the access and, in some cases, the price of these channels; 13.29% indicated that it is due to the technicality they use; and 10.63% referred to the fact that the public is very defined and a younger *target* is not taken into account. Some examples of these responses are shown below:

"I believe that the diversity of means of conveying information from this type of magazine

is necessary, I mean, the more means they have and the more modernized they are,

will get more attention.

- "It would take more variety and aimed at all types of audiences."
- "I think using social media could give them a plus to reach more people."
- "Nobody reads magazines anymore, practically. They need to renew themselves."
- "I think it should be given more visibility so that people know more about it."

The last question raises the possibility that science outreach on social networks may increase the interest of younger audiences. A total of 74.4% said yes, 27.7% said "probably" and 2.1% said "no".

Discussion

From the above it can be interpreted that, among the main problems to connect this relationship between students and scientific journals, are the lack of promotion, lack of knowledge and the scope of these.

Despite the push and the updates that some scientific journals carry out to broaden their audience, young university students are not particularly interested in this type of publications. For these reasons, it is worth asking for future lines of research whether more efforts should be unified between scientists, journals and university teaching staff to introduce students to this field. In addition, it would be appropriate to question whether the scientific dissemination also has to go through the registration of traditional social networks as do newspapers, companies, agencies, institutions or musical groups, and whether the fact of being on YouTube, Instagram or Facebook, guarantees an increase in traffic in reading and consultation of the articles and research published or whether it would simply serve as a tool to help position the journal in digital search engines.

Conclusions

Thanks to the data obtained, it has been possible to know aspects such as; the main reason for consultation by young people, their perception of scientific dissemination, the role of social networks and the way in which these could bring these contents to a younger audience. Thus, the results reveal the importance of the presence of scientific information in social networks, as well as the applications most used by the *target* in question.

The study highlights the importance of adapting scientific dissemination to the preferences of young university students, using social networks and attractive content. It also suggests the need to join efforts between scientists, journals and teaching staff to encourage students' interest in science outreach. It also raises questions about the

relevance of the presence in traditional social networks and their effect on the dissemination of scientific research

Likewise, young university students demand scientific publication in other languages, as they have made known in the form previously filled out, free and open access or specialized journals focused on a single subject. The different data and information from the study have shown the importance of being present in social networks, especially with regard to the younger audience, and other aspects to be taken into account such as simplicity of language and the use of graphic and audiovisual content. In short, if scientific journals were present in networks, used less technical language and responded to the demand for renewal, they would increase their readership and even attract a hitherto distant audience.

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OPEN DIGITAL EDUCATIONAL RESOURCES ANALYSIS IN THE NATURAL SCIENCES IN RURAL INSTITUTIONS WITH SECONDARY EDUCATION IN BOYACÁ, COLOMBIA

ANÁLISIS DE RECURSOS EDUCATIVOS DIGITALES ABIERTOS EN LAS CIENCIAS NATURALES EN INSTITUCIONES RURALES CON EDUCACIÓN SECUNDARIA DE BOYACÁ, COLOMBIA

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ABSTRACT

The objective of the study is was to determine the improvement in the level of Natural Sciences (NS) skills in high school students from Naguata, El Escobal and El Cruce educational institutions, through the incorporation of open digital educational resources (ODER), adapted as a strategy of use pedagogy of Information Communication Technologies (ICT), in non-contact teaching-learning processes. The methodology developed had a mixed approach, with a greater incidence of the qualitative methodology, but complemented with the quantitative one; The sample was made up of 231 high school students who participated in the characterization, application and evaluation of the strategy through different research instruments whose results were statistically analyzed through the SPSS 21 software. The results included the characterization of the study population; on the order hand it was found that there is a strong linear correlation relationship between the level of competences and the pedagogical use of ICT with ODER, in the educational institutions of study, it is was established that the improvement in the competences of NS is associated with on both the educational purpose and the methodological aspects that characterize the teacher when making pedagogical use of the ODER. One of the contributions offered by this research was to organize a repository with the ODER selected and adapted to the context for the area of NS, as a proposal to improve scientific skills in secondary school students from rural institutions. Bearing in mind that the strategy intends to be developed in non-presential situations, regardless of what causes this situation, the present study gives relevance to the pedagogical guide.

RESUMEN

El objetivo del estudio fue determinar la mejora en el nivel de competencias de Ciencias Naturales (CN) en los estudiantes de

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secundaria de las instituciones educativas Naguata, El Escobal y El Cruce, mediante la incorporación de recursos educativos digitales abiertas (REDA), adaptados como estrategia del uso pedagógico de las Tecnologías de la Información y Comunicación (TIC), en procesos no presenciales de enseñanza – aprendizaje. La metodología desarrollada tuvo un enfoque mixto, con mayor incidencia de la metodología cualitativa, pero complementada con la cuantitativa; la muestra la constituyó 231 estudiantes de secundaria que intervinieron en la caracterización, aplicación y evaluación de la estrategia mediante diferentes instrumentos de investigación cuyos resultados se analizaron estadísticamente a través del software SPSS 21. Los resultados incluyeron la caracterización de la población de estudio; por otro lado se encontró que existe correlación lineal fuerte entre el nivel de competencias y el uso pedagógico de las TIC con REDA, en las instituciones de estudio, se estableció que el mejoramiento en las competencias de CN está asociado con Finalidad educativa y los Aspectos metodológicos que caracterizan al docente cuando realiza uso pedagógico de REDA. Uno de los aportes que ofrece esta investigación fue organizar un repositorio con los REDA seleccionados y adaptados al contexto para el área de CN, como propuesta de mejora de las competencias científicas en los estudiantes de secundaria de instituciones rurales. Teniendo en cuenta que la estrategia pretende desarrollarse en situaciones de no presencialidad, independientemente de lo que cause esta situación, el presente estudio da relevancia a la guía pedagógica.

Introduction

This document presents an approach to the use of ICT in the teaching-learning process of NC content, in order to improve scientific competencies and learning as defined by the guidelines of the Ministry of National Education (MEN), through the analysis of Open Digital Educational Resources (REDA), for their subsequent selection and adaptation for students in the seventh, ninth, tenth and eleventh grades of three educational institutions in the rural sector of the Department of Boyacá, Colombia.

Initially, the theoretical reference of the study is presented, mainly related to the pedagogical use of ICTs and the appropriation of REDA in the context of the COVID-19 pandemic. The methodological aspects include the description of the mixed research design, the participation of the 231 students and 6 teachers, the instruments used in the characterization and application of the strategy, as well as the use of SPSS21 software for the statistical analysis of the information obtained. The results include the characterization of the study population and finally, in the last section, the conclusions and discussion are presented.

Literature review

Of the studies related to the pedagogical use of ICT (Butcher, 2015; Guevara, 2017; Hidalgo, 2016; Ibarra, 2017; Molina, 2018; Open Education Group [OEG], c. 2021; Said et al., 2015; Vivas, 2017), among others, most of ~~them~~ mention the positive impact of the use of ICT in the educational environment, particularly in the distance modality. The bibliographic review corresponds to studies developed in recent years, but the incorporation of ICT has been going on for a long time, as presented by international and regional initiatives in Latin America, including Colombia, where the MEN has been making efforts to improve the conditions and technological infrastructure since the National Program for the Use of Media and ICT (2003 - 2011) and later through the consolidation of the National System of Educational Innovation with the use of ICT, which promoted the design and implementation of the National Strategy of Open Digital Educational Resources**,** initially oriented to Higher Education and then with the creation of the Colombia Aprende Educational Portal, which presents a series of resources organized by subjects, competencies and levels of education (preschool, elementary, middle and higher education), aimed at teachers, students and the community in general, with free access. This Educational Portal is constantly being updated and the number of REDA (with the participation of universities) is increasing in order to improve pedagogical support through this Repository.

BBC News World (2020) in a report on competitiveness in attracting talent, states that "more than half the population in the developing world lacks basic digital skills" (para. 2). This situation is specific to the context involving the rural educational institutions of Ramiriquí and Tuta (in the Department of Boyacá)there may be an incipient use of the few technological tools available, but these skills need to be developed as an integral part of the education being provided, since the current digital culture in which we are all immersed demands it.

According to Rueda and Franco (2018), the national education policy, based on the commitment signed at the 2003 World Summit on the Information Society in Geneva, seeks digital literacy and the development of digital competencies, making investments in connectivity, training and provision of equipment, aspects that have not been sufficient to transform the practices of educational actors.

A recent study by Sales et al. (2020), on the informational and digital competence (CID) of students and teachers of Social Sciences from three Spanish universities, before and during the confinement by COVID - 19, concludes that the professors participating in this study have a critical view of the cited competence of the student, attributing to them a lack of capacity for evaluation, critical use and communication of information, despite the mastery of technological applications and the massive use of mobile devices.

The results of this research are not very far from the reality of the rural institutions under study, essentially in three aspects: 1) the level of CID varies markedly from one teacher to another; 2) students are skilled in the use of technology, but not in the use of information and; 3) the virtual teaching-learning methodology, as a consequence of the pandemic, has favored the development of digital competencies in both teachers and students, but informational competence continues to stagnate.

Despite the contradictions presented by various sources such as those cited above, it is evident that the technological development of ICTs is influential in education, as expressed by Palacios et al. (2020) that today it is difficult to understand learning and teaching processes without technology[b].

Ibarra, et al. (2017), point out some examples in Latin American countries, of failures in academic results, due to the inadequate incorporation of ICT, due to the lack of real mechanisms of computer literacy, i.e. there is no technological appropriation. The particular characteristics of rural education, very similar to those found in Colombia, are highlighted, such as the distance of the educational institution from the urban area, poor accessibility of vehicles, scarce economic and educational resources; the rigidity, distance and institutional isolation of the school, the persistence of traditional pedagogical practices, the lack of adequate curricular integration of ICTs and the scarce training of teachers and managers in virtual environments. This generates a challenge for creativity and innovation that the teacher has to assume.

Guevara et al. (2017), present an article in the IV *Workshop* on Open Educational Resources, of a research conducted after the implementation of didactic guides to students of Secondary Education in Ecuador, whose design and elaboration acquired the category of OER with a constructivist approach, using didactic materials made from solid waste from the students' environment, which also involved collaborative work and little online use due to limited access to the internet. Although it is an excellent reference, the present work intends to expand the type of resources to be incorporated in the Learning Guide, while maintaining the intention that the guide itself constitutes a REDA[c].

Allendes and Gómez (2021) present a study related to the production of OER as a non face-to-face teaching practice of second year university students in Information Technology in Science Education in Biology, developed in La Plata, Argentina. The authors emphasize that Learning and Knowledge Technologies (LKT) go beyond learning to use ICT and should be seen as a means of teaching and learning content in Biology. The study took into account the principle of using OER and *Creative Commons* licenses, offering a guideline for the search and selection of OER for the area of Biology.

Salas and Gutiérrez (2020) make an important contribution related to the implications of increasing the levels of appropriation of open educational resources in the

[b] Corroborated by Morales, 2020; Murphy et al., 2020; ~~BSNL and Extramarks Education, (2017, para. 6)~~; Rusitoru et al., 2016; Salcedo et al., 2021.

[c] Guevara et al. (2017, p. 3) points out as important aspects of the use of the Didactic Guide as OER, the following: they offer multiple options for content search; flexibility in terms of consultation schedules; facilitates autonomous learning and outside the classroom; increases creativity and the habit of innovating; encourages the user to socialize and improve the information, creating awareness in order to share new educational resources aimed at solving problems of society.

educational institution 41008 Manuel Muñoz Najar (Arequipa) in Peru, in the context of the COVID 19 pandemic. The study took into account teachers and students, and also provided a series of guidelines to enhance accessibility to OER. The authors mention that the number of teachers who make pedagogical use of technology is minimal. Thus, most schools in Latin America do not have the necessary skills to design or use virtual learning environments, and it is necessary for teachers to receive specific training in this area.

Román (2020), developed a study that aimed to know the adversities, the competencies to be implemented, and the challenges that educational actors have had to face due to the virtual adjustments brought about by the COVID-19 health contingency; for teachers and students it is necessary to develop self-learning, autonomy and socioemotional competencies. The research concludes that teachers face a variety of aspects that influence academic development, specifically two: structural conditions (technology, digital media, geographic space and Internet connectivity); and areas directly related to their possibilities as individuals (socioemotional aspects, digital competencies, new ways of learning, communication and effective organization).

Rueda and Franco (2018) present an approach to the appropriation of Colombian public policy related to ICT in education, during the period 2000 to 2019. Among other aspects, it was concluded that, despite the investment made in connectivity and equipment, public policy has not transformed the practices of educational actors. Other studies in Colombia related to the use and appropriation of ICTs in education are: Acosta and Sierra (2018); Buitrago and Caicedo (2019); Colorado (2016); Jiménez and Segovia (2020); Hidalgo, Tenorio and Ramírez (2016); Lizarazo, et al. (2015); Molina and Mesa (2018); Real (2019); Rojas (2020); Ruíz (2018); Said et al. (2015); Vivas, Gómez, Chávez (2017).

Regarding the evaluation of OER, Gordillo, Barra and Quemada (2018); Gordillo, Lopez and Verbert (2020), developed research on measuring the quality of OER. In the first case, the authors suggest that recommender systems using pedagogical quality data be complemented with pedagogical quality scores when evaluating OER from the repositories that contain them. Acuña (2021) presents the ECOBA (Evaluation of Quality of Learning Objects) instrument, which makes it possible to compare the level reached by an object within a scale through the relevance of the contents, the aesthetic, functional and instructional design of the objects and the assurance of competencies through evaluation and feedback activities.

Marín et al. (2019) present a study where they recognize the broad pedagogical opportunities offered by the use of REDA, but highlight the need to deepen research training through the collaborative selection and evaluation of this type of resources, for which they suggest recommendations on the evaluation and use of LORI (*Learning Object Review Instrument*) and suggestions for the creators of educational resources for research training, so as to ensure the quality of these materials. As a result of the study, it is observed that students mainly demand the availability of updated resources, with relevant content, that offer support and allow interaction.

Within the legal framework of research, it is important to mention *open licenses* to emphasize *copyright*. According to Bates (2015), the FDL (*Free Documentation License*) was widely used by the Wilkipedia site, but was replaced by the *Creative Commons* CC license because its use was confusing and impractical. There are other types of licenses, such as those created for music and art, but the most common is *Creative Commons*. This licensing model, designed by Larry Lessin of Stanford University in 2001, provides open licenses for easy-to-use digital materials, thus avoiding automatic copyright restrictions. In the Free Software and Open Source environment, four types of freedom are specified: freedom 0, to run the program for any purpose; freedom 1, to adapt the program with

prior knowledge of its operation; freedom 2, to distribute copies; freedom 3, to improve the program and disseminate those improvements. The author mentions as limitations in the use of OER, their low quality and the distrust generated by the fact that they are free of charge.

The ICT use policies raised by Butcher (2015), have a sense of applicability of OER, always favoring their use in distance educational processes, but clarifying the copyright through the license that allows free access, in addition these policies should be under permanent review.

According to Said et al. (2015), the articulation of the ICT and Education Ministries in Colombia through Law 1341 of 2009, seeks to offer diversity of content, learning objects and digital educational materials, expanding cooperation between countries and encouraging the production of these tools in educational communities; it also seeks to offer training services in ICT management to teachers at all levels and consolidate a bank of learning objects with free access for educational institutions that have limited access due to their geographical location.

MAGISTERIO TV Channel (2021), sponsored by the Colombian Ministry of Education, analyzes aspects related to pedagogical guides. Dr. Pablo Romero emphasizes that the design and implementation of a pedagogical guide must consider the principles of inclusion and ensure accessibility, i.e., ensure the understanding of everyone; if the guide needs the support of someone, it is an indication of non-accessibility. In addition to the principles of quality, diversity, relevance, participation, equity and interculturality, it proposes that teachers be trained in five areas: knowing how to know, knowing how to think, knowing how to do, knowing how to innovate and knowing how to be and feel.

Method

Taking into account the nature of the research, a mixed design is considered, with a greater incidence of qualitative methodology, but complemented with quantitative methodology through the measurement of variables, thus the methodological design includes some aspects of the positivist empirical paradigm and its explanatory correlational character[d]. According to the level of depth, the research design has a *descriptive correlational* character. Descriptive because it involves the systematic collection and presentation of data to "measure" the variables defined in the research and from this measurement to identify the *correlation* of variables, which will allow making incipient associations with a *partial explanatory value*[e].

The information provided by the aforementioned rural schools is available for the benefit of the official educational institutions of the Department of Boyacá that belong to this sector and that offer basic secondary and middle school education. The primary unit of analysis is *the student* and as a secondary unit of analysis *the teacher*.

Based on the population universe, a sample design of 231 students from the seventh, ninth, tenth and eleventh grades of the technical schools Naguata and Escobal (Ramiriquí) and El Cruce (Tuta) was determined. For the secondary unit of analysis, there are six CN teachers from the three institutions (2 for each institution). For the case of the student sample, a confidence level of 95% ($\alpha = 0.5$) and a margin of error $e = \pm 0.5\%$ is taken.

[4] The typology given by Hernández, Fernández and Baptista (2010, p. 77 - 78) is taken as a reference, considering four types of research (exploratory, descriptive, correlational and explanatory), which refer to the scope that a scientific research can have.

As for the data collection techniques, this study included a review of official documents (PEI[f], ICFES results, COMPUCOL report card), participant observation (through the observation diary instrument), and surveys of students and teachers before and after the use of the strategy. Following the parameters of quantitative research, these instruments were validated according to Aiken's V coefficient and were subjected to reliability analysis based on Pearson's correlation coefficient, in order to optimize the collection, verification and purification of the data obtained.

Once this process was completed, the analysis of REDA as a non-presential strategy for the pedagogical use of ICT in rural secondary schools in Boyacá was carried out through multivariate regression analysis using IBM SPSS Statistics 21 software.

Once the characterization has been developed, the selection process of the EWNs is carried out simultaneously, taking into account the bibliography consulted and the evaluation rubrics, both of the repository and of the selected resource. Once this process is completed, the corresponding adjustments are made to the resource evaluation rubric in order to refine the selection of resources to be adapted.

The selected resources are consolidated in a matrix where the resources are related to the different learning processes established by the MEN for the NC area.

The incorporation of these resources in the area is permanently followed up by the teachers in order to obtain relevant information regarding the level of appropriation of the resource.

Three hypotheses are proposed: 1) there are significant relationships between the academic goals of the students and the strategies for the pedagogical use of ICT (REDA adaptation); 2) there are significant relationships between the application of strategies for the pedagogical use of ICT and the development of competencies in Natural Sciences; 3) there is a relationship between the level of digital competencies of the teacher and the innovative use of ICT tools as a pedagogical strategy.

The instruments applied in phase I were the sociodemographic form, the initial questionnaire for students, the questionnaire for NC teachers, the academic goals scale and the PEI documentary. For the development of phase II, the instruments were the initial rubric for the evaluation of each selected educational resource and the observation diary. Phase III took into account the documentary instrument (ICFES results, SABER test interpretation guide, COMPUCOL reports), the format for comparing internal and external test results and the instrument , which considers the student's final assessment of the level of acceptance of the REDA used by the NC teacher as a strategy for the pedagogical use of ICT.

For data analysis using SPSS 21 software, the statistical test for normality was taken into account through the Kolmogorov-Smirnov statistic, to determine whether the correlation is parametric or not (Pearson or Spearman correlation coefficient). The teacher evaluates the rubric using a rating scale for each of the items of the instrument and determines whether it is useful for the teaching-learning process (if the percentage obtained is equal to or greater than 80%, the application of the resource will be considered viable and subject to continuous improvement). A descriptive and comparative analysis of the results reported by the ICFES (external tests) and those provided by the COMPUCOL platform and teachers' spreadsheets (internal tests) is also performed.

[f] PEI: Institutional Educational Project

Results

Characterization

The sociodemographic questionnaire corroborated the low socioeconomic level of the families of the respective educational communities, the existence of parental responsibility for linking their children to the educational system, despite their low academic training, the scarce participation in cultural activities; it was also found that 30% of the students do not have family support and that there is little family unity, situations that affect their emotional and economic aspects and have repercussions on their academic performance.

Statistical analysis of students' academic goals led to the acceptance of the hypothesis. "there is no correlation between the data obtained by the group of students who responded affirmatively to the initial question, with respect to those who responded negatively", indicating that for the students their *learning, achievement* and *social effort goals* are independent of the use or non-use of ICT by NC teachers, with a 95% confidence level.

The results of the questionnaire applied to teachers indicated that both the level of digital competencies and the use of ICT resources in their teaching-learning processes were good. This result favored the implementation of the strategy.

From the initial questionnaire applied to the students, they know and make constant use of ICTs; it was found that there is an average value of acceptance of the classes in which teachers use ICTs and that they *do* know how to use them, at the same time that this constitutes a necessary tool for their own education. On the other hand, students rely on the information they find on the Internet rather than on books, so a lack of critical stance is evident.

Among the most frequently used ICT devices and resources are audiovisual equipment, smartphones with internet access, WhatsApp chat, search engines such as Google, mobile applications and internet, so it could be corroborated that the most frequent form of communication is the WhatsApp chat from their cell phone.

According to the point of view of the students surveyed, most subjects make some use of ICT. In the particular case of NC, the result was 30%.

Results

- The type and quantity of educational resources currently used by teachers and students of the three institutions in the teaching-learning process is very scarce. From the *non-presential* approach, the REDA are downloaded and sent to students via WhatsApp. Accordingly, the size and duration of the REDA file should be a maximum of 16 MB on all platforms.
- The general criterion for the selection and adaptation of REDA is the affirmative answer to the questions: Does the resource support learning for students whose access to technology tools and connectivity is limited? Does the resource conform to a non-face-to-face methodology? The other criteria correspond to the items indicated for four aspects, according to educational intentions, attention to student diversity, learning requirements and formal aspects.
- Consolidation of MEN vs. REDA apprenticeships. For each learning (depending on the grade) the content of the resource, its location (URL) and the adaptation made are specified.
- Evaluation rubric that includes 25 criteria to be evaluated on a scale of 1 to 4, to analyze the effectiveness of each REDA. Thus, Table 1 was obtained.

Table 1

Average evaluation by type of EWN according to Initial Evaluation Rubric

Type of EWN	Average value [a]
Interactive platform (knowledge construction)	81[b]
Interactive platform (learning assessment)	83
Simulators (knowledge construction)	80
Simulators (learning assessment)	84
ICFES platform: Evaluate to advance (competency-based evaluation)	82
YouTube videos (knowledge construction)	85
YouTube videos (learning assessment)	80
Web page (knowledge construction)	80
Web page (learning assessment)	80

Note.

[a] Obtained by applying the criteria of the initial evaluation rubric of the adapted resource

[b] Corresponds to the arithmetic average of all the interactive platform type EWRNs whose pedagogical purpose was the construction of knowledge. It should always be ≥ 80.

- For most types of REDA, teachers observe a *medium* to *high* level of acceptance, indicating that this pedagogical strategy favors the learning environment; there is some level of use of REDA when teachers make pedagogical use of them; teachers recognize the usefulness of the list of resources provided to each institution as it is associated with the learning defined by the MEN, thus facilitating class planning.
- With respect to the three institutions, when averaging the results of the Saber11° tests, there is an increase in the year 2022 for the NC test of 3 points, indicating an improvement in the level of scientific competencies evaluated by the ICFES.
- From the comparison of internal tests, in the Naguata and El Escobal institutions, the evaluations obtained in the area for the years 2019-2022 did not present significant changes; however, an improvement in the results in 2022 with respect to 2021 is observed, since in the first year there was a loss in the area (Low Performance) and in the second year the percentage in this performance was 0%. This result indicates that using the strategy favors the students' performance level in the area of analysis. For the IE El Cruce, the scores obtained were lower compared to the two schools in Ramiriquí. It should be noted that the best results were obtained in 2020 due to the flexibility that was necessary due to the pandemic, but at the same time it was evident that the use of this type of resources constituted the teaching-learning strategy that was most adapted to the non-presential situation.

The situation in 2021 indicated the inconveniences generated by the process of gradual return to face-to-face attendance, which caused certain emotional and social traumas with unfavorable repercussions at the academic level, as cited by Chemes (2022) and Aguilar (2022).

- For the final survey applied to the students, statistical analysis was performed by grouping the questions according to the variables to be correlated: V1 *level of competences* (dimensions D1: Creativity and critical thinking, D2: Improvement in competencies) and V2 *pedagogical use of ICT using REDA* (dimensions D3: Educational purpose, D4: Methodological aspects).

From dimension 1, *almost always* the use of the strategy motivates students to explore new things and apply their intellectual skills and they feel that the use of the REDA

has allowed them to better understand the relationship between Science, Technology and Society; for the improvement of competencies in NC (dimension 2), the result indicates that students consider the activities proposed through these resources as a good strategy to improve communication skills and explanation of natural phenomena as well as to use in a more appropriate way the concepts of NC; regarding the educational purpose, students consider that when their teacher uses these digital resources, it awakens their interest in learning, they also feel comfortable because the teacher values the learning achieved with the strategy and they recognize the explanation given by the teacher regarding the objective of using a certain digital resource; finally, within the questions associated with dimension 4, students rate the level of ICT management *almost always* as excellent.

Most of the methodological aspects considered in the survey are questioned by the students when assigning the category a *few times*, constituting an alarm to reformulate the selection of the digital educational resource, because for them, these resources are not novel.

The answers given regarding whether the teacher informs about the intellectual property regulations of the resources used or shares the link of the digital educational resource present a high dispersion with respect to the average, which also suggests a questioning of the teaching practice, since for the student it is not clear whether or not these methodological aspects, so important from the ethical and procedural point of view, are complied with or not.

Once the conditions for the application of the reliability analysis of Cronbach's alpha test (reliability statistic 0.732 and 0.7769) were met, it was possible to establish that there is a strong linear correlation between the level of NC competencies and the pedagogical use of REDA, that is, the application of the didactic strategy related to the pedagogical use of REDA influences the improvement of competencies in the area of study. Table 2 consolidates the results of the correlations established.

Table 2

Pearson's coefficient for correlations established between dimensions and variables

Related variables	Pearson's coefficient [a]	Interpretation of the correlation [b]
V1 and V2	0.587	Fort
D1 and V2	0.563	Fort
D2 and V2	0.267	Weak
D1 and D3	0.552	Fort
D1 and D4	0.453	Moderate
D2 and D3	0.239	Weak
D2 and D4	0.237	Weak

Note.

[a] Significance: 0.01: 1% error and 99% confidence; bilateral significance of 0.000, less than 0.01

[b] According to Hernández et al. (2018)

In all cases, variable V2 (and its dimensions) are considered independent variables and therefore variable V1 (and its dimensions), the dependent variable.

To apply Pearson's coefficient, the questions were rated by the students with a numerical score (Likert scale). For example, from 1 to 4 as the student considers the recurrence of the aspect: *Never, Sometimes, Almost always and Always*. In addition, all items were adjusted by recoding the data so that they measured the desired characteristic in the same direction, i.e. the items had the same sense of response: the higher the score,

the greater the favorability. Thus, the conditions for the application of the Cronbach's alpha test reliability analysis were met.

Discussion and conclusions

The contribution to knowledge offered by this research is the organization of a REDA repository for the apprenticeships established by the MEN in the area of Natural Sciences, in order to offer an alternative to the repository of the Colombia Aprende Portal. This organization of resources will remain open not only for its use but also to be continuously updated, according to the trends that will be developed with respect to ICT, thus fulfilling the function of any repository: "publicly communicate the work of researchers, thus increasing its dissemination" (Guevara, Mora, Delgado, & Peralta, 2017, p. 2).

The strong linear correlation found between variables V1 and V2 indicates the positive association between the incorporation of REDA adapted as a strategy for the pedagogical use of ICT in non-face-to-face teaching-learning processes and the level of improvement of competencies in Natural Sciences.

The strategies for the pedagogical use of ICTs are essentially related to the adaptation of the REDA, for which an evaluation rubric was designed for each type of resource. This rubric contains the criteria defined from the sociodemographic characterization, academic goals, perception of teachers in the area and the initial perception of students regarding the use of information and communication technology (ICT) devices and resources.

Compliance with the criteria contemplated in the evaluation rubric is related to its validation. If the percentage obtained from the evaluation scale is greater than 80%, the application of the resource will be considered viable and subject to continuous improvement.

The types of resources that were adapted and applied according to the feasibility given by the evaluation rubric and whose educational purpose was focused on the construction of knowledge and evaluation of learning, were: interactive platform, simulators, ICFES platform, YouTube videos and web pages.

According to the students' appreciation, the use of ICT resources is a methodological aspect that is unfavorable for learning and indicates a certain deficiency in the digital competencies of teachers. This statement leads to the acceptance of the hypothesis *that there is a relationship between the level of digital competencies of the teacher and the innovative use of ICT tools as a pedagogical strategy*.

It is important to consider in the application of the strategy that the teacher verifies the URL[g] of the REDA resource, but mainly he/she must guarantee the student its functionality and availability, taking into account that the methodology is not face-to-face.

The pedagogical guide is the fundamental tool that constitutes the non-presential teaching strategy in rural institutions, because when considering its functions of knowledge management and autonomous learning, it orients the purpose of training in self-understanding to think with foundation, to argue with evidence and to innovate without ceasing to be a better person. This requires the adequate design of the pedagogical guide where it is also indicated that the use of REDA is one of the didactic strategies that allows activating the learning process; thus, the REDA included in the pedagogical guide are selected according to the expected learning, objectives and

[g] URL: Uniform Resource Locator and is the unique and specific address assigned to each of the resources available on the World Wide Web so that they can be located by the browser and visited by users.

performances. Depending on the digital resources available to the students, this guide can be a digital resource by itself or a tangible physical resource, which requires printing it on paper.

The level of improvement in NC competencies, once the REDA were incorporated, was carried out by comparing the ICFES results (external tests that objectively measure student performance) for the years 2018 to 2022, and the COMPUCOL results (internal tests), for the years 2019 to 2022; in both cases, improvement in results was observed. In addition, based on the Observation Diary, the teachers determined that there is a good level of use of the REDA used in the teaching-learning activities.

One of the limitations for the development of the research was the consolidation of the EWNs, a very complex task due to the fact that the selection process contains a series of aspects to be taken into account, not only in quantity but also in their diverse nature, because the greatest possible coverage was sought that included the particularities of the context.

During the time of the COVID-19 pandemic, the dependence of rural students on their teachers caused confusion and lack of motivation, generating little student commitment, increased absenteeism and desertion, not only in the institutions involved, but also at a general level in the country. This scenario was the greatest obstacle to the development of this study, but at the same time it was the driving force behind the search for solutions that led to the effective achievement of the objectives set out in the research.

In order to reduce this negative impact generated by the situation of non-presence in the institutions, it was decided to design the learning guides with too much detail. This implied the use of a greater amount of paper, that is to say, the academic problem was partially solved, but another environmental problem was generated. In addition to this situation, the Secretary of Education of Boyacá gave the guideline to the educational institutions to increase flexibility both in planning and in the way of evaluating, originating a certain chaos in the evaluation given to the students.

The innovation developed in the present research and supported by the described results, consisted in verifying that the use of open, selected and adapted digital educational resources constitutes a *non-presential* teaching-learning strategy for competencies in Natural Sciences in rural educational institutions in Boyacá, which can be extrapolated to other areas of knowledge and to other institutions with similar conditions, located in municipalities in Colombia that belong to the same category as the municipalities on which the research is based (sixth category).

A future action that can be a continuation of the effective achievements of the research is to include interactive resources built with the students themselves through platforms such as Word Wall, Educaplay, JClic, Padlet, Quizizz, eXeLearning, Mentimeter, among others, and that strengthen critical reading.

Any improvement based on the results of this research should be extrapolated to other areas of knowledge and to all rural and urban institutions in Boyacá with projection to the country. In this way it is possible to contribute to the improvement of the quality of education, which is the key to the progress and development of any society.

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THE USE OF MOBILE DEVICES LIKE LEARNING EVALUATION REAL TOOL

EL USO DE DISPOSITIVOS MÓVILES COMO HERRAMIENTA DE EVALUACIÓN EN TIEMPO REAL DEL APRENDIZAJE

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ABSTRACT

The school confinement by COVID19 confirmed the need for the use of mobile devices that facilitate and allow a normal flow of the PPEA in education. It also served to verify that not all schoolchildren could, for various reasons, access them, which is why the educational administration had to intervene to provide schoolchildren and provide families with tools such as tablets, laptops and access points Wi-Fi.Despite this and given the delay in acting, many teachers and families have chosen to include Smartphones as usable devices in order to normalize the situation, thus facilitating the exercise of their functions, something that clashes with the provisions and guidelines legislative and centers that reject such devices as school tools. A study aimed at the teaching community has served to show the previous rejection and a commitment to the future of said technology, after a timely implementation and enhancement. And it is that the teacher is aware that the situation experienced can be repeated at any time and without prior notice, for which he needs to be not only alert but also trained and willing to use them.

Palabras clave:
smartphone, evaluación, tiempo real, herramientas TIC, aula 3.0.

RESUMEN

El confinamiento escolar por COVID19 constató la necesidad del uso de dispositivos móviles que facilitasen y permitiesen un normal discurrir de los PPEA en la educación. También sirvió para constatar que no todos los escolares podían, por diversos motivos, acceder a los mismos, de ahí que la administración educativa tuviese que intervenir para proporcionar a los escolares y facilitar a las familias herramientas tales como Tablet, ordenadores

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	portátiles y puntos de acceso Wi-Fi. A pesar de esto y dada la tardanza en actuar, muchos docentes y familias han optado por incluir los Smartphone como dispositivos usables con el fin de normalizar la situación, facilitando de esta forma el ejercicio de sus funciones, algo que choca con las disposiciones y directrices legislativas y de los centros que rechazan dichos dispositivos como herramientas escolares. Un estudio dirigido a la comunidad docente ha servido para mostrar el rechazo previo y una apuesta de futuro sobre dicha tecnología, tras una implantación y puesta en valor puntual. Y es que el docente es consciente de que la situación vivida, puede repetirse en cualquier momento y sin previo aviso, para lo cual precisa estar no sólo en alerta sino también formado y dispuesto a utilizarlas.

Introduction

The introduction of any tool in an environment where it performs certain functions is associated with a series of intrinsic aspects including: timing, cost, training, expected results vs. results obtained. All this also entails constant evaluation throughout its implementation and use, in order to determine or improve certain aspects that result in results equal to or above expectations.

In the classroom, this process requires a set of elements not contemplated, such as: acceptance and rejection by the agents involved in the training processes, something that will have a direct and decisive impact on the results obtained.

This is because the rejection of them is motivated, to a large extent, by the fact that their implementation and operation in the classroom and in the educational center requires certain training for teachers, something that usually happens to the detriment of time outside the school environment, i.e., taking time away from personal time dedicated to personal matters such as leisure and family.

Looking back, it can be seen that, throughout the history of education, the inclusion of new tools has always raised misgivings, as is currently happening, where the introduction of mobile devices such as the Tablet and Smartphone brings out conflicting positions about the inclusion and use of them in the classroom and in the family environment.

This article aims not only to address, but to put on the table the pros and cons of the use of Tablet and Smartphone and how these tools can impact on real-time, individualized assessment on the students who use them and the teachers who implement them. A detailed study of a real case of implementation in a secondary school will allow us to determine how its use is perceived before and after its introduction and how it affects the teaching-learning processes (from now on PPEA) in schoolchildren, as well as whether its acquisition is economically feasible, replacing traditional tools.

We have to go back to the eighties of the last century to talk about the access of ICT tools to the educational system. A few years earlier, the personal computer, known as the PC (*Personal Computer*), was born. This tool makes the leap from laboratories and research centers to the home, and then to educational centers. Domestic consumption of these technological devices soon began to increase, largely due to the appearance of new manufacturers such as CYRIX and AMD, which competed with IBM and Intel in the race for control of sales in the segment that opened its doors to their introduction, school and education. The new business attracts manufacturers such as Apple, Dell, Xerox, Osborne, to name a few (Today, 2017).

It was not until the early 90's that, through programs of introduction and school integration of equipment and software, in extracurricular activities, that PCs began to occupy a space previously focused on manual practice activities such as EATP (Technical-Professional Education and Activities), a set of optional subjects that students had to choose in the second and third years of BUP (Bachillerato Unificado Polivalente) as stated in the General Law of Education, popularly known as Villar Palasí Law (BOE, 1970). These courses were of a technical-professional nature and included technical drawing, electronics and computer science. The use of PCs was relegated either to this educational practice or to extracurricular education linked to formal education, under the control of parents' associations (AMPAs) or other extracurricular non-formal education, under the control of the different training academies that began to offer PC-based learning classes as a tool for transmitting the PPEAs.

With the so-called democratization of the Internet (García Pascual, 2011**)** in the first decade of this century, components and equipment assembly became cheaper, which allowed access to any home. On the other hand, in the classroom, in line with this process, something similar was happening. Students began to use the PC in part or in all subjects as a complementary tool to the book and as a substitute for the typewriter, required to prepare activities such as reports or papers.

In this second decade of the 21st Century, it can already be observed how something similar is happening with the new ICT tools, specifically with Tablets and smartphones that integrate software capable of connecting to the Internet, with features similar to a laptop, the Smartphone (Saussure-Figueroa Portilla, 2016).

The introduction of these devices has given rise to a series of mixed feelings among the agents involved in the PPEAs, both in favor and against, with arguments that even go so far as to question the statements made previously. But it is not only the agents involved in the PPEAs who are reluctant to integrate these devices. The political class itself, largely responsible for curriculum design, has avoided the use of these devices, based on arguments about the benefits of using traditional tools such as books, or the use of writing devices such as pencils, pens, or pens for the benefit of good writing and correct posture; or at the ophthalmological level because of the less negative repercussions of traditional technologies compared to modern ones. The fact is that the tools, which could be described as traditional, are better suited to the transmission of traditional learning to the detriment of ICT tools that focus on what could be described as active learning.

To this must be added that the introduction of these new tools, which will be qualified as ICT, requires a series of adjustments, which entail an initial cost overrun, since they require a cost for the adaptation of the centers for their discretionary use, both by students and teachers; a material cost, for the acquisition of these tools, a cost considerably higher than that of traditional tools; a human cost, for the training and adaptation requirements in their handling and use; a technological cost, for the need to create and adapt/convert traditional tools to new digital tools in order to ensure their proper use among the members of the educational community.

This brings with it an initial rejection, which can be considered as generalized and independent with respect to the actors of the PPEAs.

Thus, families are opposed to their sons and daughters using, instead of books, ICT tools that require the use of the Internet, that need to feed their batteries with electricity, with the expense that this entails; having the device and the programs for educational and common use constantly updated, and a long etcetera that could be added. Added to this is the cost in terms of time, time for training, adaptation, content creation... which usually comes at the expense of the teacher's personal time, something he/she is not willing to compromise on.

To this must also be added certain reforms at the legislative level, starting from the academic curriculum, making them effective at each and every level: center, classroom, students.

But rejection is not only determined by these variables. A fundamental variable is that related to the results that the implementation has reported in different educational stages throughout the educational community, becoming palpable in electronic newscasts, blogs, and research articles which leads to affirm in the words of Mosquera-Gende (2018) that one cannot live with one's back to technology.

The confinement by COVID that required these tools has led to a new situation, the current one, where not all are positions against (idDOCENTE, 2022), but many of them have a solid scientific-educational basis based on specific studies that collect the implementation of this new methodology, which they consider an educational

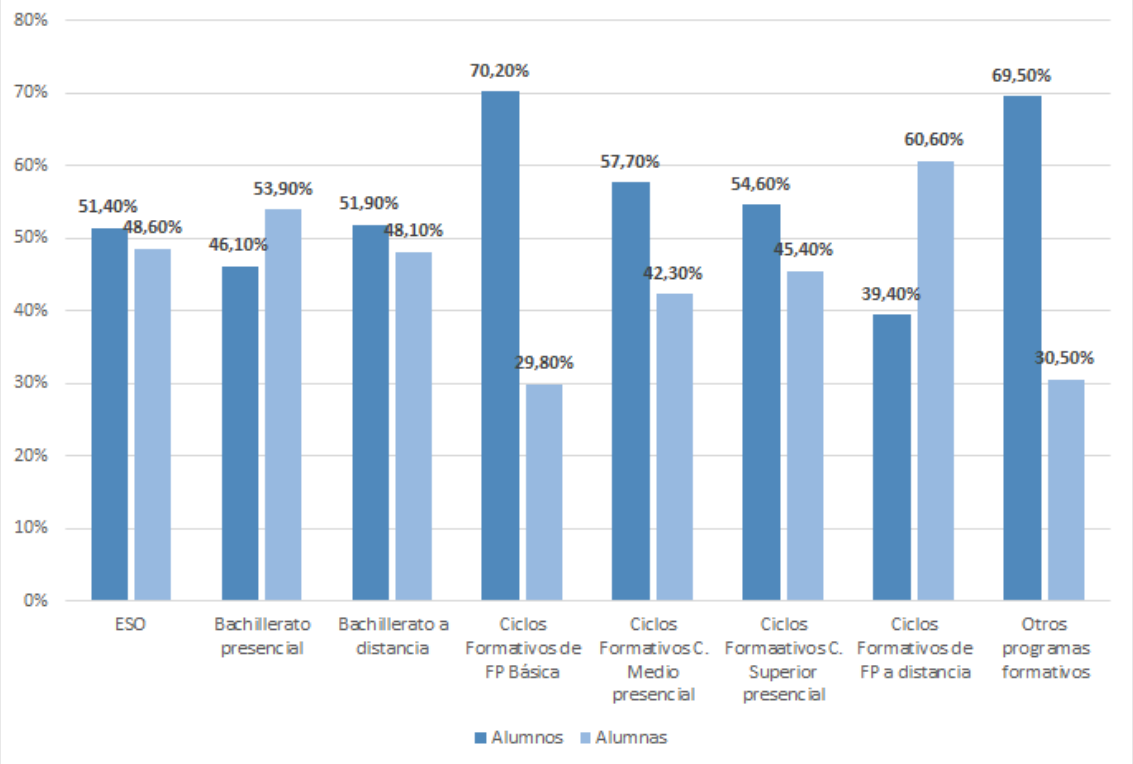
opportunity. Despite the advantages shown by mobile devices as an educational resource, many are the authors who highlight some of the disadvantages that can bring the use of such technology in the classroom such as: addiction, small screens that derive in vision problems, obsolescence as stated by Vega Magro (2018) However there are teachers who believe in its application as a methodological tool as they consider its application as a qualitative improvement in terms of daily evaluation, thanks to the implementation of ICT tools for real-time evaluation, allowing students to know where and what to improve, acquiring the set of the two classrooms, where they have been implemented, the basic competences contemplated in the curriculum of the subject and educational level.

At this point it is necessary to determine how these ICT tools modify the teaching-learning processes, which leads to the realization of a study about the agents involved in learning, carrying it out in the fourth year of Compulsory Secondary Education (ESO), in particular, we have analyzed all students, teachers and families, in order to draw conclusions both individually and as a group, either from one of the participating groups, or intertwined results by considering more than one group.

The analysis of both the teaching population and the sample of the fourth year of ESO was carried out during the third quarter, in a subsidized school in the Autonomous Community of Galicia, where the failure rate is 40% (Chaparro, 2020) and the dropout rate is 8.1%, and where female students account for 44.9% of the school population compared to male students who make up the remaining 55.1% (Statista, 2023). Figure 1 shows the distribution of the ESO school population by gender and type of education received.

Figure 1

Ratio of male and female students in secondary education by type in Spain 2021/2022

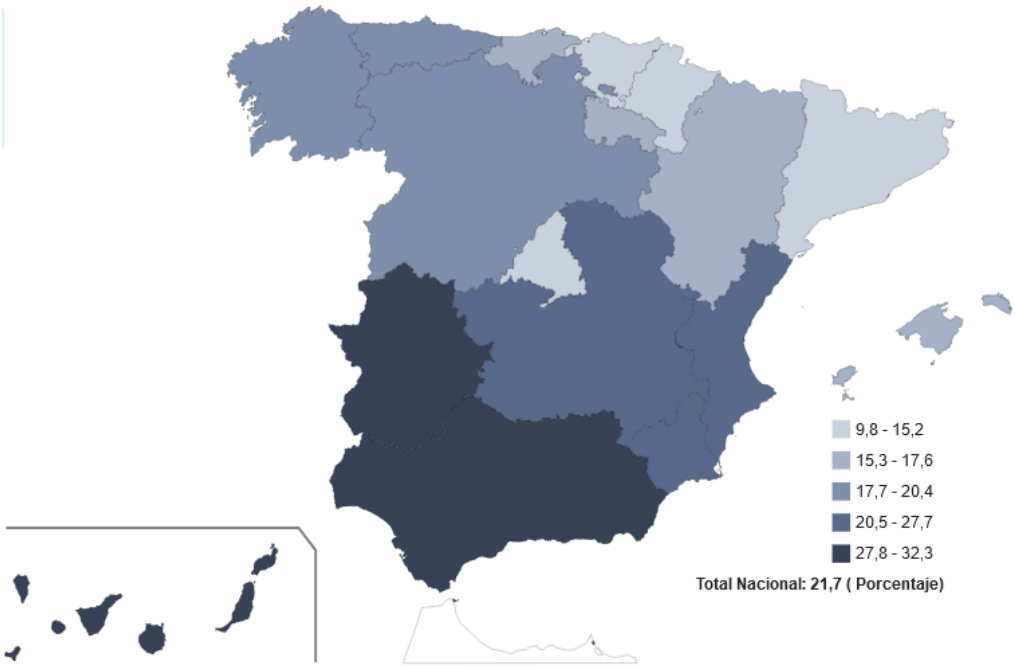


Note. Taken from Statista.com (2023) based on INE (Instituto Nacional de Estadística) data

As for the socioeconomic level of families and students, this can be classified, following Seguí (1996) as medium-low based on data extracted from the INE (2021), which can be seen in Figure 2 showing the poverty risk rate by autonomous communities for the year 2021, with Galicia at a rate below the average.

Figure 2

At-risk-of-poverty rate vs. autonomous communities for 2021



Note. Taken from INE (2021)

The starting point of the study was taken by reviewing the effects observed after confinement by COVID. The first phase of the study was carried out during the 2020-2021 academic year, continuing with a new phase during the second school term of the 2021-2022 academic year. In both cases, the same group of students and teachers has been analyzed, which has made it possible to contrast and determine the particular observations of both groups in the periods before, during and after the pandemic.

At the social level, the latest economic crisis has brought with it the appearance of a new social gap that further deepens, if possible, the differences between autonomous communities and segments of society. At the school level, this gap materializes in the education received, which, although it reaches practically the entire population, does so in very different ways, as Borreguero (2020) points out. Schools have emerged that make use of new technologies and active methodologies that are not available to everyone, nor are they put into practice in all schools.

The COVID brought with it not only the school confinement of practically all schoolchildren, not only Galicians or Spaniards, but also throughout the world (UNESCO, 2023). It also brought a before and after in the way teaching-learning processes were transmitted, from being practiced face-to-face, to become a model that can be described as distance transmission (OECD, 2020).

In addition, confinement led to a reduction in contact between schoolchildren (Ortiz, 2021), reducing the process of socialization and contact between peers, which

resulted in a series of psychological problems, disorders at very early ages, such as ADHD (Salas-Sánchez and Peñas-Rojas, 2021) and other new disorders that are manifesting themselves as time goes by (Cifuentes-Faura, 2020).

The lack of adaptability to the situation, the lack of foresight in the face of such complex scenarios (Ponce & Luján, 2022) and the lack of teachers and specific tools for a distance educational transmission (Villafuerte, 2022), have been factors that may have helped to further deepen, if possible, the existing educational gap, or the emergence of a new one of a specific nature and of a more technological typology (Mur Sangrá, 2016).

Method

Taking the autonomous community as a starting point, since it is the only one that can provide solutions to the problem in all its dimensions: social, economic and educational (Trujillo, 2020), an instrument of analysis of the educational reality is designed for all teachers working in the C.A. of Galicia (Spain). de Galicia (Spain), which will serve, given its relevance and significance, to extrapolate to the educational community as a whole, aspects such as vision of the educational reality, idiosyncrasies in the use of mobile devices in the exercise of their teaching practice, the problems to access them, and the particular vision of families and educational administration, reluctant regarding their use at school level.

A representative and proportionally distributed sample was taken from all the teachers assigned to each of the four provinces that make up the Autonomous Community of Galicia, without distinguishing between the types of centers to which they are assigned. Figure 3 shows schematically the restrictions imposed on the collection and measurement instrument used.

Figure 3

Measuring instrument restrictions

$$\#N=12500|_{95\%\text{-}5\%} \rightarrow \#n=273 \rightarrow \propto \left\{ \begin{matrix} \%\,Coruña \\ \%\,Lugo \\ \%\,Ourense \\ \%Pontevedra \end{matrix} \right\} centros: públicos, privados, concertados \; \text{ł}_{género}$$

Figure 3 refers to the cardinality of the starting set (teaching population of the Autonomous Community of Galicia), i.e., the number of teachers assigned to this autonomous community, as well as the restrictions initially established in terms of reliability and assumed percentage error, while #n refers to the sample size necessary to comply with the previously established conditions of the study.

This sample has been distributed proportionally for each province, according to the total number of teachers assigned to it and with total independence of the type of center and without any distinction as to the gender of the participants. In this last aspect, the approach to parity of the participants has been initially favored. However, this has not been achieved due to the need to observe several extractions-submissions in order to reach the required number of participants based on the sample size.

The methodology followed for the mixed study was based on the treatment of the information collected through a quantitative-qualitative survey addressed to the target population of 1,500 teachers in the Autonomous Community of Galicia who work in public, private and subsidized schools. The sample, 373 individuals, was drawn proportionally with respect to the total number of teachers in each of the provinces that

make up the Autonomous Community of Galicia (INE, 2020), as shown in Table 1. The probabilistic and anonymous nature of the study in the extraction of the participants and the collection of their responses, gives it the representativeness required in any study that follows the scientific method.

Table 1

Sample and its segmentation by provinces

	La Coruña	**Lugo**	**Orense**	**Pontevedra**	**Total**
Population	1.120.185	324.419	304.104	942.849	2.691.557
%	41,62	12,05	11,30	35,03	100,00
Sample	155	45	42	131	373

Note. Own elaboration based on INE population data (2020)

This survey focuses on the characterization of the situation in the periods before, during and after the COVID confinement, which will provide a more objective analysis of the changes it caused at the school level in each of the periods analyzed.

On the other hand, a follow-up survey on the implementation of new mobile devices in two classrooms of the fourth year of ESO (Compulsory Secondary Education) in a school in the province of Pontevedra belonging to the Autonomous Community of Galicia has been used as a basis for the analysis of the ICT context. This survey will make it possible to determine the degree of acceptance and availability in terms of the use of mobile devices as educational tools, as well as to evaluate in real time, thanks to software tools integrated in the same, both the teacher's training action and the degree of acquisition of competencies and skills among the participating students. Table 2 and Table 3 show the data on the sample in terms of students, teachers and families participating in this second analysis.

Table 2

Description of the sample in terms of the participating students

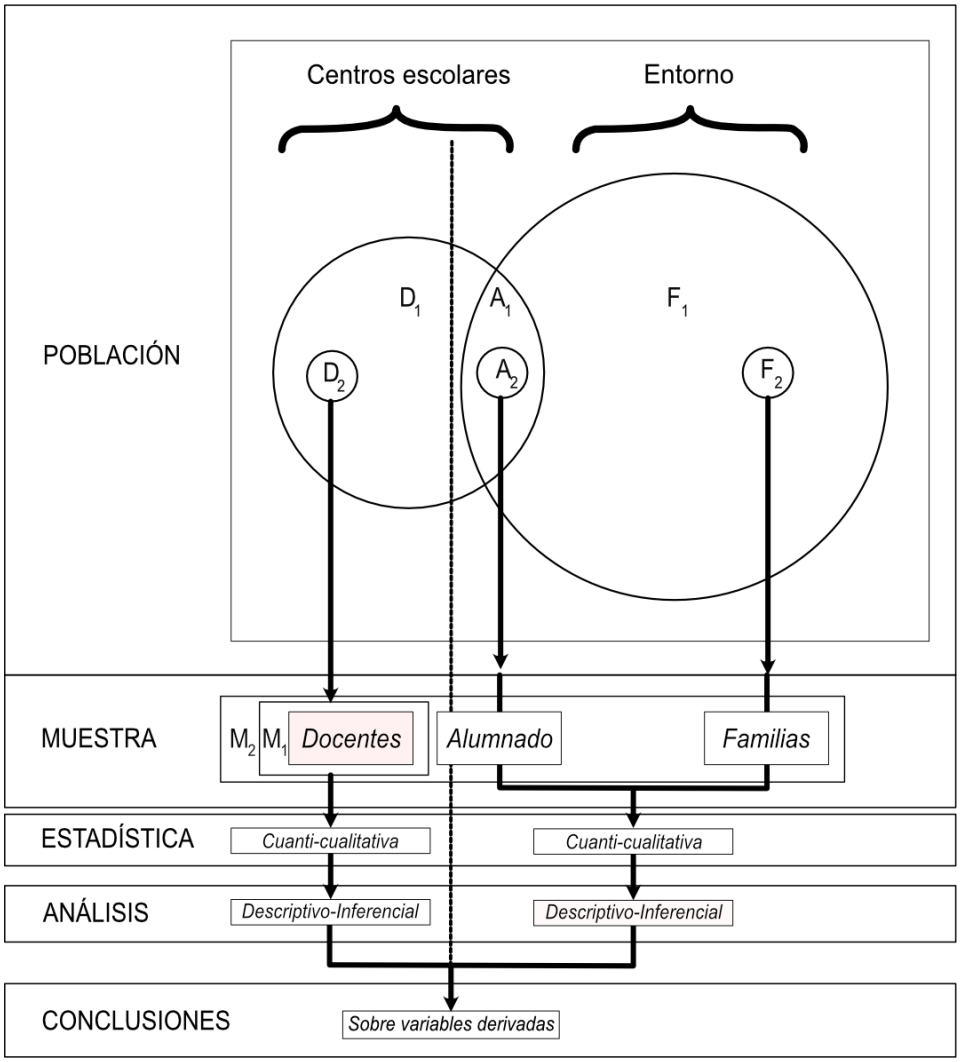
	4th A		**4th B**	
Alumni	**no**	**%**	**no**	**%**
Boys	6	0,353	11	0,647
Girls	11	0,647	6	0,353
Totals	17	1	17	1

Table 3
Description of the sample of participating teachers and families

Teachers	no	%	Families	no	%
Men	6	0,261	Parent	9	0,265
Women	17	0,739	Parent	25	0,735
Totals	23	1	Totals	34	1

Figure 4 shows the diagram of the methodology applied to the statistical study contemplated in this article. The differentiated treatment of the 2 samples can be observed in the same, so that after obtaining the respective statistical results, conclusions can be drawn as a whole.

Figure 4
Diagram of study execution



The main objective addressed in the present study consists of: *To study the relationship between the use of mobile devices in the classroom in conjunction with real-time assessment tools and the improvement in the degree of acquisition of competencies by the participating students*.

In order to determine this relationship, the study poses a series of questions by collecting the answers to the same through an electronic form that will allow us to determine whether the use of devices and tools designed to integrate them in schools lead to substantial improvements in terms of educational transmission and evaluation, determine a change of position in teachers regarding the introduction and use of these devices in the classroom and how families and teachers see the change of reality in their use, going from a mere object of entertainment to an educational tool, as well as their functionality in situations of absence of educational presence due to confinement or other similar situations.

The following specific objectives are derived from this objective:

- To assess whether mobile devices can be introduced in the classroom because they are considered as tools that facilitate and improve the acquisition of skills among students in Compulsory Secondary Education.
- To observe the degree of acquisition of competencies among students, after the implementation of mobile devices in the classroom containing real-time assessment software tools.
- To analyze how the perception of the actors involved in the teaching-learning processes has changed regarding the use of mobile tools and devices in the classroom and at home.
- To determine their influence on the degree of acquisition of the competencies established in the academic curriculum of the fourth year of ESO.
- To contrast the functionality in situations that prevent face-to-face presence in the teaching-learning processes.
- To verify the existence of an educational gap caused by the use and introduction of mobile devices after the COVID pandemic.

The methodology used for the present study is characterized by a two-sample analysis of related target populations. The first of these is aimed at teachers in the Autonomous Community of Galicia who carry out their academic work in educational stages below university level.

A quantitative-qualitative analysis has been applied to this sample, which has a set of initial or starting variables, as well as other derived variables, obtained from the initial variables by means of a set of arithmetic rules that define them. The existence of derived variables is determined by an affinity between the participants in the definition. Thus the derived variables will be defined by the equations: v'_1, v'_2, v'_3, v'_4, v'_5 y v'_6 respectively.

In that equation v'[i] corresponds to the derivative variable and v_i the initial or starting variable. Thus, the analysis "will make it possible to describe the reality-object of study, an aspect of it, in order to clarify a truth, corroborate a statement or verify one or more hypotheses", as Niño (2021) states. The study involves extrapolating it to other populations and centers, either in the same or different autonomous community or nation, which would substantially favor not only the acquisition of results, but also the reaffirmation of the conclusions pursued.

The second of the samples is addressed to students, teachers and family of fourth grade of ESO. In the first case, sample selection criteria and the collection of confidential and automated information will be applied, using an electronic form to avoid duplication of responses, modification and/or manipulation, guaranteeing the anonymity of the participants at all times.

Table 4 shows the data sheet for the first of the surveys analyzed in this article.

Table 4
Galicia-COVID 19 Teachers Survey Fact Sheet

Galicia and COVID19 Teachers' Survey Technical Sheet	
Sample universe	Teachers of the Autonomous Community of Galicia
Objective of the survey	Analyzing the current educational situation after a situation of school confinement by COVID
Type of sample	Simple random proportional to the number of teachers in each province
Realization time	1 school term
Data collection technique	By anonymized electronic form linked to a spreadsheet with limitation to 1 attempt
Type of study	Quantitative-qualitative
Population size	12500
Confidence level	95%
Margin of error	$\pm 5\%$
No. individuals studied	373

The second of the populations studied has the particularity that it is limited to only 34 individuals, so it was decided to consider the sample in its entirety, so that $E \subseteq \Omega$being #E the cardinality of the sample (number of participants) and Ω the cardinality corresponding to the population studied.

In order to determine the degree of reliability of the study, a series of instruments were applied, such as: sample normality analysis, to determine the reliability in each of the samples studied; hypothesis testing for each of the objectives based on the Kolmogorov-Smirnov test (2) in the first of the samples, to determine which of the hypotheses proposed, the null (H0) or the alternative (H1), should be adopted, given that the sample is larger than 50 individuals (Zachs 2020a). On the second sample, shown in Figure 4, a Shapiro-Wilk test (1) will be performed, since the sample studied is smaller than 50 individuals, a restriction imposed by this statistic in its definition (Zachs 2020b).

$$W = \frac{(\sum_{i=1}^{n} a_i \, s_i)^2}{\sum_{i=1}^{n}(x_i - \overline{x})^2} \tag{1}$$

$$F_{n(x)} = \frac{1}{n}\sum_{i=1}^{n} \begin{cases} 1 \; si \; y_1 \leq x \\ 0 \; alternativa \end{cases} \tag{2}$$

For two tails the statistic is given by:

$$D_n^+ = máx\ (F_n(x) - F(x))$$

$$D_n^- = máx(F(x)\ - F_n\ (x))$$

In order to determine the validity and reliability of the instruments used in this study, we proceeded to determine the Cronbach's α-Cronbach's test, which in the words of Tuapanta Dacto et al. (2017) is an index that measures the internal consistency of a scale that serves to evaluate the extent to which the indices of an instrument are correlated, i.e., the internal relationship between 2 or more items with each other, thus allowing to corroborate the absence of errors in the selection and collection of data.

Table 5 shows the reliability of the set of variables involved in the study, broken down according to each of the samples participating in the study.

Table 5

Cronbach α-Cronbach's test on the variables participating in the study

Sample	α-Cronbach	Participating elements
Teachers in Galicia	0,840	373
4th ESO	0,899	91

Based on the results obtained, it is determined that, in the case of the sample of teachers from Galicia, the result obtained is 0.840, which falls within the interval [0.8-1.0], which corroborates that the study on the sample analyzed has a reliability that can be classified as high. In the case of the sample obtained for the fourth year of ESO students, its value is 0.899, which, as in the previous case, is within the interval [0.8-1.0], so that, as in the previous case, the reliability is rated as high, as can be seen in Table 6.

Table 6

Cronbach's α-Reliability Intervals

α-Cronbach				
Very Low	Under	Moderate	Good	High
[0-0,2)	[0,2-0,4)	[0,4-0,6)	[0,6-0,8)	[0,8-1)

Results

The results that will be shown below are determined by the study carried out through the samples analyzed on the previously stated objectives.

Objective 1: Value the introduction of mobile devices in the classroom as real-time assessment tools. It consists of analyzing the convenience of implementing mobile devices

with real-time evaluation tools in the classroom and their consideration as educational tools.

This objective is analyzed taking into consideration the study variable derived v_1'obtained from the arithmetic operation of the sum of the variables variation of the degree of acquisition in the student body, teacher perception and parental perception as defined by the equation:

$$v_1' = competencias_i + percepción_{docente} + percepción_{familia} + percepción_{alumnado} \quad (3)$$

The results obtained show that the school community as a whole considered the introduction and use of mobile devices to be convenient. At the same time, they consider that the software tools that can be distributed integrated in them, favor the real time evaluation of students and teachers, having an impact on the improvement of the degree of acquisition of educational competences.

Objective 2: To observe how mobile devices facilitate the acquisition of skills in ESO students where this technology has been implemented.

To the question of whether: Mobile devices are not perceived as necessary tools in the classroom to improve the degree of acquisition of competencies of students in Compulsory Secondary Education.

This objective is analyzed by taking into consideration the study variable derived from v_2'obtained as the product of the variables variation of the degree of acquisition in the student body, teacher perception and parental perception as defined by equation 4:

$$v_2' = (competencias_i * valoración - \text{uso}_{\text{alumno}_i}) \quad (4)$$

Objective 3: Perceive pedagogical improvements in the use of mobile devices in the transmission of PPEA at the classroom and home level.

To the question of whether: Mobile devices are not perceived as necessary tools in the classroom to improve the degree of acquisition of competencies among students in Compulsory Secondary Education.

This objective is analyzed by taking into consideration the study variable derived by aggregating the following variables v_3'obtained by aggregating the variables variation of the degree of acquisition in the student body, teacher perception and parental perception as defined by equation 5:

$$v_3' = (uso_i + manejo_i) * (evaluación_i - exámen_i) \quad (5)$$

Objective 4: To determine how these ICT tools influence the degree of acquisition of the competencies set by the academic curriculum.

This objective is analyzed by taking into consideration the study variable derived from v_4'obtained as an aggregation of the variables variation of the degree of acquisition in the student body, teacher perception and parental perception as defined by equation 6:

$$v_4' = (exámen_i + evaluación_i) * competencias_i \quad (6)$$

Objective 5: Analyze the functionality of these tools in situations of absence of presence, as occurred during the COVID pandemic.

This objective is analyzed by taking into consideration the study variable derived by aggregating the following variables v_5'obtained by aggregating the variables variation of the degree of acquisition in the student body, teacher perception and parental perception as defined by equation 7:

$$v_5' = uso_{movil\_i} * (percepción_{docente_i} + percepción_{familia_i}) \quad (7)$$

Objective 6: To verify the existence of a gap associated with ICT components that will prevent all families from accessing the tools to be introduced.

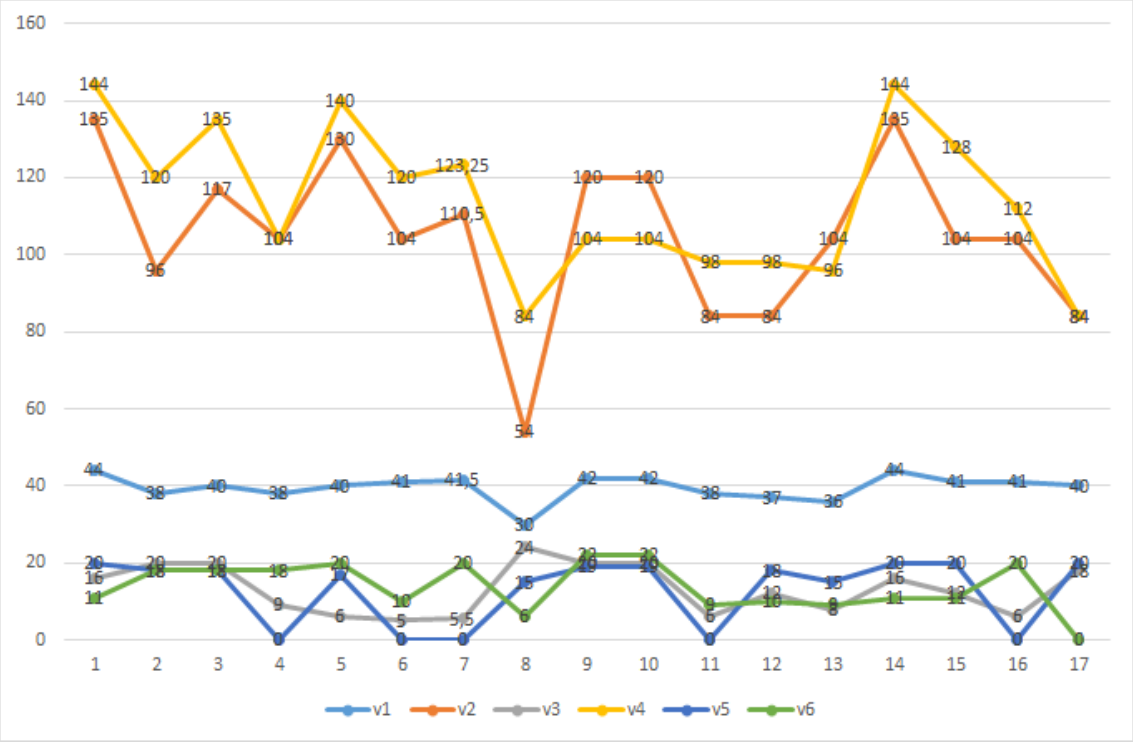
This objective is analyzed by taking into consideration the study variable derived by aggregating the following variables v_6'obtained by aggregating the variables variation of the degree of acquisition in the student body, teacher perception and parental perception as defined by equation 8:

$$v_6' = (grado\ adquisición_{alumnado_i} + percepción_{docente_i} + percepción\_familia_i) \quad (8)$$

Figure 5 shows the application of the derived variables $v_1' a v_6'$ obtained from the different starting variables involved in the study. This result is the result of applying the definition of each one of them to the different samples in which they participate.

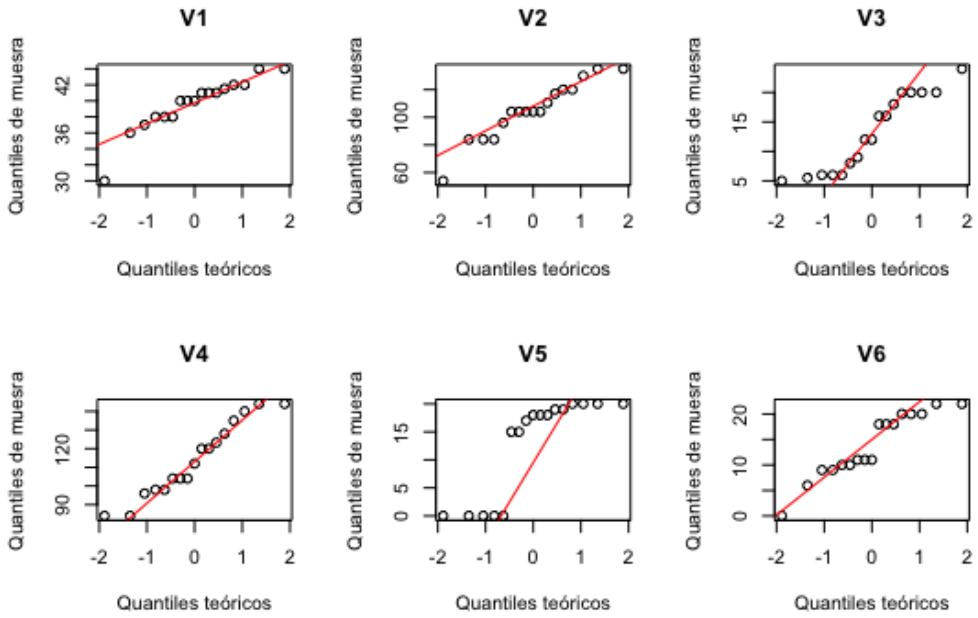
Figure 5

Results of the application on the variables under study v_1 to v_6



As for the determination of whether the data studied have the normality required in studies of this nature, it can be seen in Figure 6 that the normality of the data is reaffirmed, thus guaranteeing the results and conclusions obtained from the samples analyzed and the participating variables.

Figure 6
QQ (Quantil-Quantil) plots of the variables v_1 to v_6 involved in the study



Note. Own elaboration (2022) based on R-Pubs-Various graphs in one (Ortiz, 2016).

Discussion and conclusions

The analysis of the proposed objectives leads to the fact that for the:

Objective 1. In the statistical analysis of the hypothesis testing of the variable associated with this objective, the corresponding variable yields a p-value equal to 0.03846. Since this value is less than 0.05, hypothesis H_1 = Teachers consider it convenient to implement mobile devices in the classroom to use them as real-time assessment tools, to the detriment of hypothesis H_0 = Teachers do not consider it convenient to implement mobile devices in the classroom to use them as real-time assessment tools.

Objective 2. In the statistical analysis of the hypothesis testing of the variable associated with this objective, the corresponding variable yields a p-value equal to 0.2869. Since this value is greater than 0.05, the hypothesis H_0 = Mobile devices do not facilitate the acquisition of skills among ESO students is adopted as valid, instead of the alternative hypothesis H_1 = Mobile devices facilitate the acquisition of skills among ESO students.

Objective 3. In the statistical analysis of the hypothesis testing of the variable associated with this objective, the corresponding variable yields a p-value equal to 0.04632. Since this value is less than 0.05, hypothesis H_1 = Teachers perceive pedagogical improvements due to the use of mobile devices in the PPEAs is adopted as valid, to the detriment of hypothesis H_0 = Teachers do not perceive pedagogical improvements due to the use of mobile devices in the PPEAs.

Objective 4. In the statistical analysis of the hypothesis contrast of the variable associated with this objective, the corresponding variable yields a p-value equal to 0.3216. Since this value is greater than 0.05, the hypothesis$_{H0}$ = Mobile devices are not perceived as necessary tools in the classroom to improve the degree of acquisition of skills among students in Compulsory Secondary Education is adopted as valid, instead of the alternative hypothesis H_1 = Mobile devices are perceived as necessary tools in the classroom to improve the degree of acquisition of skills among students in Compulsory Secondary Education.

Objective 5. In the statistical analysis of the hypothesis contrast of the variable associated with this objective, the corresponding variable yields a p-value equal to 0.0001157. Since this value is less than 0.05], the hypothesis H_1 = Mobile devices do not report functional improvements in situations of absence from school, as occurred during the COVID pandemic, is adopted as valid instead of H_0 = Mobile devices do not report functional improvements in situations of absence from school, as occurred during the COVID pandemic.

Objective 6. In the statistical analysis of the hypothesis contrast of the variable associated with this objective, the corresponding variable yields a p-value equal to 0.08702. Since this value is greater than 0.05, the hypothesis H_0 = There is no perception of a gap associated with ICT components that will prevent all families from having access to the tools to be introduced in the classroom is adopted as valid, instead of H_1 = There is a perception of a gap associated with ICT components that will prevent all families from having access to the tools to be introduced in the classroom.

As a result of the discussion following the analysis carried out on the objectives set out, it can be determined that: initially, teachers and parents were opposed to the use of mobile devices in the classroom, considering them more as an amusement than as a methodological-educational tool.

The students have a diametrically opposed view, since, although it is true that the use they have been making of cell phones coincides with that expressed by parents and teachers, they consider that an alternative use can be contemplated at the educational level, thus allowing a methodological change, which would require specific training of all the actors involved in the PPEAs (teachers, students and families).

Teachers and parents have changed the way they view and consider mobile devices after their implementation in the classroom, in fact, they have determined new approaches and methodologies that can be integrated and coexist alongside the new models introduced by the use of mobile devices as stated by Carrasco (2023).

The development and implementation of specific software can facilitate the teaching work, complementing the educational exercise in the evaluation process of the actions carried out, shortening the time of action-evaluation, which will have a positive impact on the training and degree of acquisition of competencies by the students.

The use of these assessment tools will introduce a new way of acting for the teacher, moving to a higher level, that of manager and guide in the PPEA, focusing on the students, thus transforming learning and relegating its memoristic nature.

The confinement by COVID has only revealed a certain deterioration in education, largely due to the interpretative and legislative differences between the different administrations involved in the drafting of school curricula and the divergent views between autonomous communities, not only at the political-ideological level but also at the north-south geographical level.

The need for a change in education, hand in hand with universal access to mobile devices, raises the question of whether these devices will be available to everyone, since it has been observed that, despite promoting access to mobile devices in the classroom, this change may upset the expectations created, largely due to the new technological crisis that has arisen associated with the lack of silicon-derived components.

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ARCHETYPES OF ACTIVE TEACHING IN THE PERSPECTIVE OF HIGH SCHOOL STUDENTS

ARQUETIPOS DE LA ENSEÑANZA ACTIVA EN LA PERSPECTIVA ESTUDIANTIL DE EDUCACIÓN MEDIA SUPERIOR

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symbols, archetypes, meaningful teaching, hermeneutics, school permanence.

ABSTRACT

The purpose of the research carried out was to identify symbols associated with the assessment of permanence in school by students who have reached the last cycles of Higher Secondary Education. Our proposal is a structural interrogative method based on hermeneutics that reveals symbolic, imaginary and mythical structures that underlie the discourse of students in the State of Querétaro, Mexico. The speech of a student group, represented by 77 students distributed in 11 discussion groups, was analyzed; To this end, a range of own instruments were developed, which serve as a series of filters to recognize key moments, actors and ideas that influenced their possibilities of sustaining themselves in their school career. The peculiarity of the speech is that it serves as a collective subject of research and not for each person who expressed it at the time. Thus, the diversity of discourse containers was sifted through analytical grids and tables. Only the archetypes that result from the symbolic image that the student body develops around the forms of teaching that mean to them to strengthen their time at the educational institution are presented here. The results corroborate an interesting complexity in the resulting teaching archetypes, which, being merely theoretical entities, extracted through hermeneutic mythification, based, to name a few, on Jung, Durand, Jodelet, Cassirer, Castoriadis, De Rosa, and a theoretical-conceptual scheme is formed in favor of the construction of conditions that favor the school permanence of the youth of the studied entity.

Palabras clave:

RESUMEN

La investigación realizada tuvo la finalidad identificar símbolos asociados a la valoración de la permanencia en la escuela por parte del estudiantado que ha llegado a los últimos ciclos de Educación

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símbolos, arquetipos, docencia significativa, hermenéutica, permanencia escolar.	Media Superior. La propuesta, nuestra, es un método interrogativo estructural basado en la hermenéutica que devela estructuras simbólicas, imaginarias y míticas que subyacen en el discurso de los estudiantes en el Estado de Querétaro, México. Se analizó la alocución de un colectivo estudiantil, representado por 77 estudiantes distribuidos en 11 grupos de discusión; para ello, se elaboró un abanico de instrumentos propios, que fungen como serie de filtros para reconocer momentos, actores e ideas clave que incidieron en sus posibilidades de sostenerse en la trayectoria escolar. La peculiaridad del discurso es que funge como sujeto colectivo de investigación y no por cada persona que en su momento lo expresó. Así, se procedió a tamizar la diversidad de contenedores del discurso por medio de rejas y tablas analíticas. Se presenta aquí únicamente los arquetipos que resultan de la imagen simbólica que el estudiantado elabora en torno a las formas de docencia que le significan para afianzar su paso por la institución educativa. Los resultados corroboran una interesante complejidad en los arquetipos de docencia resultantes, los cuales, al ser entidades meramente teóricas, extraídas por medio de la mitificación hermenéutica, basada, por citar algunos, en Jung, Durand, Jodelet, Cassirer, Castoriadis, De Rosa, y se conforma un esquema teórico-conceptual a favor de la construcción de condiciones que favorecen la permanencia escolar de las juventudes de la entidad estudiada.

Introduction

Interest in teaching

Teaching is of great interest when it comes to establishing public policies on youth education. Traditionally, from the decision-making spheres, if anything, it has been based on the analysis of quantitative performance standards with respect to the knowledge that students achieve.

In this sense, there are two major spheres of impact on teaching: on the one hand, its dimension as a life project, which challenges at a personal level, as teachers; on the other hand, the one referred to the fact that teaching is not only represented by the will of individuals, but that it is always oriented, institutionally, by the socio-pedagogical policies that are promoted from the curricular discourse, the practices and worldviews that are privileged in the school and the de facto conditions offered to develop a certain teaching profile; therefore, it also determines the focus for investments, actions and State policies.

Thus, by paying attention to the above and the direct relationship that exists with the area of influence of the school as an institution, it is possible to understand why the state is interested in what policy it should direct towards education. Thus, it is necessary to note that such problems should be investigated and that this gives rise to the research presented below, which also implies a great contribution to the current national reflection on the revaluation of teaching and the pedagogical proposal of the New Mexican School (NEM), especially because the nature of the study is theoretical and also because it invites reflection on the point that the study covers and which is its main objective: how students see the knowledge they acquire in school and what makes them stay in it. This means to know how young people themselves value staying in school and to see what is significant for them to do so. In other words, the research makes it possible to address the complexity of the students' perception of their time in the classroom and the knowledge they learn there.

Thus, this study notes the need to emphasize the direct perspective of the subjects of the right to education, in an effort to move in the direction of an inclusive perspective, as well as to focus on a more comprehensive and humane vision when establishing the analysis for decision-making.

It is necessary to emphasize that the research proposal presented here is the creation of the researchers and that there is no other study like it, so it is not possible to compare it.

Institutional and formative context

Student discourse was collected in the framework of the State Program for Educational Evaluation and Improvement (PEEME 2016-2020), led by the Ministry of Education (SEDEQ) and coordinated by the State Council for Planning and Programming of Higher Secondary Education (CEPPEMS). The program established two evaluation projects focused on the effectiveness of programs against school dropout and on formative evaluation practices in the classroom, aimed at taking practical actions for educational improvement. The deployment carried out was very important, since it was possible to work without resources, based on the sum of institutional, professional and personal will; involving 14 institutions and 19 specialists assigned to committees and 20 other supports; deploying four major evaluation instruments, taking up here the discussion groups with students in the last cycle.

The richness of the data provided ample opportunity to explore issues that could not be addressed, given the timing and focus of the PEEME. Among them, the role of affective and interrelational factors in the assumption of the EMS pathway; especially in view of the insistence of the literature in granting the symbolic processes of "hooking" with schooling a decisive role when it comes to school dropout, as do Mena, Fernández and Riviére (2010); Román (2013); Carranza and Sandoval (2015); Pogliaghi, Mata and Pérez (2015); Cano, Sánchez and Massot (2016); Miranda (2018); Weiss (2018); Quintanar, Uribe and Vallejos (2020).

In order to categorize symbolic processes, name the underlying value patterns in collective expression, conceptualize their nature and glimpse their sociocultural origins, a theoretical analysis of symbolic processes was carried out; the selection of authors reveals the transversality existing between symbolic processes, collective imagination and functions of myth, particularly with regard to the psychic, sociocultural, even epistemic and evolutionary construction of the human being.

The theoretical inquiry allowed us to configure our own methodology, corroborating that hermeneutics focuses on the interpretation of the symbolic structures of discourse, highlighting the importance of making explicit the point of view and the narrative baggage with which the hermeneutist establishes the dialogue, through the construction of discourse as a singular collective.

The current research, therefore, seeks to generate basic science from the establishment of an interrogative and scriptural method focused on hermeneutics, which unveils symbolic, imaginary and mythical structures that underlie the discourse issued by the student body; with the intention of extrapolating them to a conceptual status that contributes to the creation of theory around the symbols that give cultural (collective) meaning to school permanence.

The present study allows us to visualize the background of the causes of dropout in the current scenario by reiterating the importance of interpersonal relationships in the significance of school, which were drastically altered during the pandemic. From what the young people interviewed express about the processes of character formation, we discover some basic human references that give meaning to permanence; common factors that enable the construction of temperance to visualize, choose and forcibly clear the various causes for their own human condition that, at the time, allows them to project a purpose, make decisions, build challenges and stand up towards a transcendental mission: to conclude the EMS to go *beyond* (when the material conditions are met).

The present work, therefore, contributes to the rethinking of the definition and the transcendental purpose of being a student, in order to tie unprecedented bonds that sustain life itself and the socio-cultural fabrics around the education of our youth.

Review of relevant literature

The literature review was fundamental to the research, which is why it is so extensive. Here, it is stated in general terms.

A first section corresponds to research references in Mexico and the locality, in search of studies focused on symbolic processes from the student perspective, from 10 years ago to date; where a wide range of works were reviewed, taking as references the *Electronic Memory of the XV National Congress of Educational Research* (COMIE, 2020) and the book *La investigación educativa ante el cambio de gobierno en México (Educational research in the face of the change of government in Mexico*). *Reflections and proposals for the future* (Buendía and Álvarez, 2019).

The closest study to the current one, is presented by Ventós (2017), when talking about the *meanings of the school trajectory*, recovering some common base authors;

however, it is carried out in Uruguay. The first study diverges in the methodological plane and the scope of the sample, as well as focusing on the concepts of *experience* and *meaning*; while the current study approaches the symbolic plane through the *imaginary* and *mythical*; however, in both cases, they coincide in validating the collective discourse as representative of a broader social group.

From this, we conclude that there are important references to support and counteract the present research, but it is evident that it maintains its own nuance at the local level (state-national dimension); therefore, it is clear that it is necessary to strengthen the research with a focus on students in secondary education, as in the innovation of the thematic approach and the precision of the theoretical-methodological design provided here.

Another section deals with preliminary approaches to school *permanence* as a focus, as opposed to *dropout*. When reviewing official antecedents of educational policy and states of the art around the topic and level discussed here -López, Sañudo and Maggi (2013); Fonseca, Ibarra and Escalante (2015); Ventós (2017); Buendía and Álvarez (2019); Salgado and Hernández (2020); Magaña (2020); Alanís (2020); Osuna and Díaz (2020); Ortega, Alejo and Estrada (2020); Vuelvas (2020); Gómez (2020); Ilinich Matus (2020); Gazga (2020); López and Reyes (2020)-, it was discovered that, in the local and national context, actions are based on combating risk factors that condition school dropout; therefore, we wanted to look at the other side of the phenomenon, analyzing what gives personal and sociocultural meaning to school permanence.

School dropout, however, is relevant when considered as a mirror phenomenon of the problem, especially because of the serious social and economic implications it entails. At any stage of the school trajectory where dropout occurs, it generates exclusion, has negative consequences on human capital formation and social integration processes - Alonso (2014); Blanco, Solís and Robles (2014); SEMS (2015); Carranza and Sandoval (2015); OECD, (2016); Miranda (2019).

Regarding dropout, there is consensus, even at the international level, on certain factors that trigger it -OECD (2016); Miranda, 2018; INJUVE, 2010; Abril, Román, Cubillas and Moreno, 2008; Navarro, 2001-. Some studies coincide in characterizing it as the climax of a process in which students gradually disengage: "an accumulated process of misunderstandings with the school", in the words of Mena, Fernández and Riviére (2010, p. 122); related to a series of situations of vulnerability -social, family and school- identified as red hotspots. Leaving school is not a decision taken "lightly" or by a sudden outburst, but rather a gradual disengagement, defined as "the slow and progressive accumulation of sources of alienation from the scale of values, patterns of action and symbols of identification with the school" (Mena et al, 2010, p. 23).

The relationship between affection, expectations and school permanence, entails talking about Bourdieu's *habitus* (1999), understood as a continuous process that "implies a knowledge that allows anticipating the course of the world" (p. 188); indicating that interactions shape destinies and ways of "doing": what gives meaning to daily practice by assuming structures valued as "harmonious" for a group. The interaction between school *trajectory* and sociocultural evolution moves away from the quantitative references of performance and efficiency to recover its psychosocial and communicative dimensions; these are related to affections and meanings constructed during the school *experience* . The journey is understood as a "process of transformation that occurs over time and involves the appropriation, signification and contextualized use of both intellectual and institutional objects and resources" (Gutiérrez, Granados and Landeros, 2014, p. 6); which is in agreement with authors who insist on the need to understand

exclusion as a continuous process: Murillo, (2003), Román (2013); UNICEF (2016), De Hoyos, Rogers and Székely (2016); Quintanar, Uribe and Vallejos (2020).

A crucial section is the one dealing with the central research categories, summarized in Table 1.

Table 1

Literature review on central research categories

CATEGORY	REFERENCES	CENTRAL CONCEPTS	AUTHORS REVIEWED
Symbols, signs and supersigns	Norber Elias and supersymbolic structures	• Plans of the representation • Symbolic or supersymbolic structure • Higher symbolic structures	Elias,1994 Garcia, 2003 Valencia, 2004
	Ernest Cassirer and the second-degree image (mental image)	• Symbolic devices and networks • The symbolic warp	Amador, 2008 Cassirer, 1968, Magallanes, Donayre, Gallegos and Walter, 2021
	Notes from symbolic interactionism	• Herbert Blumer: stream-of-consciousness and self-indication • Vygotsky and the processes of cultural mediation	Blumer, 1982; Cassirer, 1968 De Rosa, 2018 Magallanes, Donayre, Gallegos and Walter, 2021 Pons, 2010 Quintanar, 2017 Vygotsky, 2015 Wolf (1999)
Imagination and collectivity	Castoriadis and the social imaginary	• Brief review of social imaginary studies • Reservation of meaning in the imaginary signification • Radical imagination and instituting social imaginary	Aliaga and Carretero, 2016 Cabrera, 2004 Castoriadis, 1997 and 1998 Urribarri, 1998 Fressard (2006)
	Social representation and symbolic imagination	• Jodelet: common sense and symbolic restitution of absence • Gilbert Durand: allegorical signs and direct consciousness	Durand, 1971 Jodelet, 1986 Jung, 1995
The mythical line and fantasy	The primordial time and image	• Alan Watts and the indeterminacy of mythical time • Carl Jung: primordial image and access to the self	Castoriadis, 1997 Jaffé, 1995 Jung, 1995 Matos, 2019 Watts, 1998
	Approximating and fulfilling: functions of fantasy	• Norber Elías and the symbols of fantasy • Gianni Rodari and approaches to the uncanny	Elias, 1994 Rodari, 2008

Finally, the review of theoretical principles for the construction of the hermeneutic model was worked on, where mythification based on the hero myth is used as a procedure to establish the hermeneutic point of view. For this purpose, the discussions with the aforementioned central categories were recovered and, for the center of the

methodological proposal, three contemporary works are focused on: Hans-George Gadamer (2013), Paul Ricœur (1965 and 2003) and Maurizio Ferraris (2000). The study led to think of hermeneutics as a process of mediation between symbols; in the case of interaction with discourse, between *what is said* and its meaning; evidenced through rewriting - a hermeneutic point of view.

Method

Central scheme, phases and instruments for discourse mythologizing

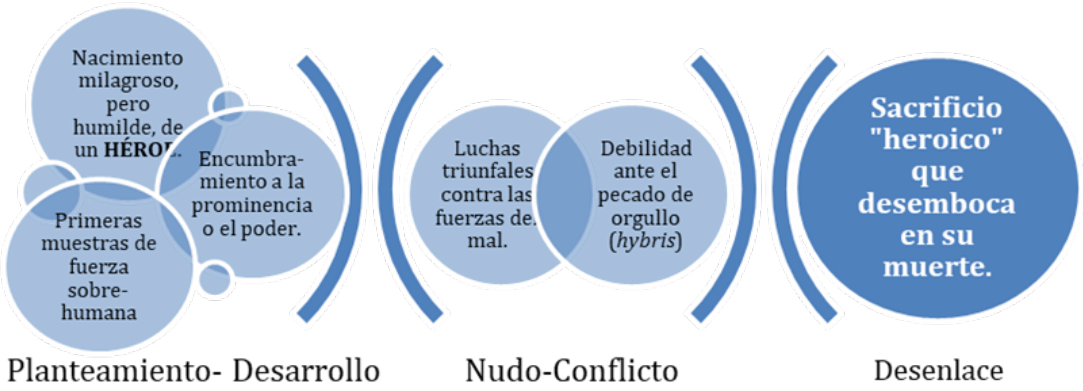
The research is based on the analysis of the discourse emitted in interviews by a group of 77 students in the last cycle of High School Education (EMS), enrolled in six of the most important subsystems in the locality and whose content makes up a total of 21 hours of videotaping, 243 pages of transcriptions and 21 pages related to observation records collected during the interviews, developed under the technique of discussion groups by a diverse collegiate. The results reveal a variety of details regarding the symbols that give meaning to the school trajectory in secondary education and, given their breadth, it is interesting to comment on those related to teaching.

The methodology yields a theoretical scheme where it is possible to observe the personalities and teaching practices that contribute to the valuation of school permanence, which are significant from the perspective of the young people themselves. The research addresses the complexity of student perception on the subject, which invites us to avoid falling into the temptation of reading the results as *terms*, since it rather yields *archetypes*, that is, symbols, which are analyzed from the perspective of authors such as Jung, Durand, Jodelet, Cassirer, Castoriadis, De Rosa, Magallane, Blumer, Ricœur, Ferraris, among others.

The study was conducted through interviews with schoolchildren before the global contingency for Covid-19 -initiated in Mexico at the end of 2019 and extended to the present-; then they worked in a face-to-face manner and today they transition to multimedia, hybrid or under the "new normal" models. However, since our research is basic, we foresaw the need to go beyond the immediate application of the basic evaluation, since it allows us to appreciate the deep human values through which the student community proposes certain paths or dreams and how these intercept the socio-cultural meanings that give meaning to permanence, beyond the modality or precisely to visualize the ideal one for the Subjects of Law and the social development of the entity under study, where the presence and human interactions take on a high value.

For the research, a hermeneutic procedure is developed, based on the mythification of the discourse, with the intention of making it collective by transferring the diversity of voices to the singular, where the hermeneut is placed in a position to accept the diversity of answers of the interviewed subjects as if they were only one, in order to narrate from a single collective voice. By taking up the structure of the hero myth as a scheme for the ordering of discourse, the hermeneut takes a position, that is, a point to maintain the thread of the story; in this way, it is the taking of an objective position, but only in the sense that the scheme allows the hermeneut to appropriate the image (the symbol), in the manner of a camera lens: as a lens to sift and focus on those aspects that are common to collective feeling and thinking.

Figure 1
Narrative structure of the hero myth



Note. Own elaboration based on information from Jung (1995).

Since the position of the hermeneut is to *tell* the story of the collective, it is observed how the mythical structure can coincide with the classic moments of the narrative; which allows orienting the interpellation by positioning oneself as *if* one were going to write the story or the plot of a movie, telling the story of the EMS student *who* manages to reach the last steps of the trajectory. Thus, Jung's (1995) myth of the hero functions as a ladder to order situations, actors and episodes of the journey through the school adventure. This implies considering the discourse as the subject of the sample, but not the people who emit it. Here, we resort to the analysis of discourse containers, with emphasis on the codes produced by Atlas Ti® when screening the transcriptions in this program.

It is fair to point out that the procedure is complex and takes time, since it is necessary to read and reread in order to extract the concepts of interest; for this purpose, a very specific resource was carried out, involving several moments and instruments specific to the researchers.

Figure 2
Study phases

Specific discourse sample

Although all the discursive containers were integrated into the overall interpretation, it was decided to select some of them as specific references. This discursive sample is determined by convenience, justified by the elements revealed by the integral scheme of symbolic analysis.

We began with a representative transcription, choosing to select the first group interviewed because it included both urban and semi-urban populations. Also, six codes from Atlas Ti® are recovered: meaningful teaching, family skills, personal goals, obstacles or challenges and socialization; as they are significant according to the references given by the first filter of analysis (corresponding to the review of the preliminary material)this

is because they are significant according to the references given by the first analysis filter (corresponding to the review of the preliminary material).

The discursive sample privileges the study of codes that account for the establishment of affective and interpersonal relationships, since the theoretical study establishes that the construction of meaning and culture, as well as tools for survival itself -as a framework of collective meanings- are generated within human interactions, under the protection of a reference group, in relation to a life context and as a need or search for knowledge. It was also necessary to review other transcriptions and codes, although, for reasons of space, it was not possible to analyze them in their specificity.

Data analysis

The methodological approaches and reading instruments (integral scheme of symbolic analysis, analytical grids and synthetic tables) function as filters that allow organizing, grouping, synthesizing and categorizing thoughts, assessments, moments and actors that influence the assumption of the EMS journey as possible and desirable. Rewriting techniques refer to synthesis, reordering, categorization and paraphrasing.

The procedure results in the construction of subcategories where associated expressions are grouped and common concepts are distinguished; as well as in the simple count of mentions associated with each one. The latter gives rise to the elaboration of *pie* charts that allow us to observe areas of symbolic classification. In this case, specific quantities are omitted in order to avoid the emphasis on the quantitative aspect, since this serves as a support for the hermeneutic qualification as a central methodology.

In threading the results, we also take up, as discursive content, the control questions inserted in the survey for senior students, as well as the results from the analysis of the anecdotal records, the subsequent descriptive report, the entrance survey applied at the beginning of the focus groups and the report on the interview with *significant teachers*.

Results

Symbolic complexity of meaningful teaching

The symbolism attached to the teaching figure is complex. The resulting archetypes show the non-existence of a single form of significance referring to the action of this figure; they act as *helpers* in the student's story. It is important to point out that the attributes anchored to teaching significance cannot be read as immovable *types* or applicable to "a" teacher or to "all" the flesh-and-blood people who work or want to work as teachers in secondary education. Since they are archetypes, they refer to *ideal*figures; that is, they express *potencies* of being. At the same time, the specific teachers referred to by the students, in effect, orbit between these attributes, and generally present more than one.

It is necessary to emphasize that the characteristics attributed to meaningful teaching are not those that a specific teacher performs *de facto* , but what the students bring to *memory*, what they *project* when they look back on the path they have traveled, when they bring to mind the *image*, the memory of that teacher who challenged them, the teacher who motivated them or whom they understood, the teacher who infected them with passion.. In a few words, the teaching that leaves a mark and helps you to solve the path or give meaning to school permanence and *knowledge* as a cultural value and value *for oneself*.

Figure 3
Symbolic composition of meaningful teaching

In the section dedicated to teaching, it was necessary to establish a special section directed to teaching archetypes, for which we took as a base the previous knowledge provided by the studies of the Master's Degree in Educational Sciences, our own experience in the Doctorate in Education where the research is framed and the continuous reading of official pedagogical models assigned to the EMS; besides, we looked for a nomenclature that synthesized the student's *sayings* , rather than defining the categories from pre-established models. On the other hand, other aspects were obtained related to what students value in terms of the ways of *being* teachers that *marked* their journey through the EMS, as shown in Figure 3.

The complexity that teaching acquires in the student imaginary presents attributions that may seem opposed and even become so, since, as already noted, these are not characteristics that can be grasped in a single stroke, nor can they be transferred to instructions for being a "good" teacher; rather, they are intermingled, they go from one side to the other, some emerge and others are depressed. There is no one way to *be* a meaningful teacher. What is clear is that this is a figure who impresses, knows, is enthusiastic, shows energy or passion; someone who *loves* (loves his craft, his subject, being with the youth). This implies considering teaching as a life project, since, in the interview with teachers pointed out by the students as *significant*, they say they feel alone and state that it is through *contagion* that they can influence other colleagues to embrace this teaching position; it is in the experience, the closeness and the daily life where significance is created; as well as in the assumption of the profession and the relationship with their students.

The Atlas Ti® yields 220 labels on meaningful teaching; while, when performing the hermeneutic reading, 340 are established, from the analysis of which eight conceptual subcategories are obtained. It should be remembered that, more than the number of times

referred to, it is of interest to observe the symbolic composition of the teacher as a significant figure in the student's trajectory. The simple exercise of counting the mentions and then visualizing the quantitative area resulted in the *pie* chart, which is highly illustrative in visual terms.

In the analysis, the concept of *symbolic composition*arises, when it is observed that the *pay* allows to *observe*, literally, the *compounds* of a *body*; in this case, of a conceptual *entity* , a social *actor* or a symbolic *actor* ; arising from the mixture and abstraction of the *collective voice*; which does not omit diversity, but, precisely, incorporates it by abstracting it into large symbolic categories that evoke the *common*sense and feeling. Given the rigor of the analysis procedure and its mixed wink, it is possible to establish these categories as symbolic components.

The *significant teacher* is a category or concept that *symbolizes* a sort of *nucleus* where the diversity of positions and human actions detected by the collective *come together* ; although it also shows a root or a meeting point among the diversity of tendencies. The symbol, then, is an inclination, a tendency or *integral* disposition towards these virtues, rather than a single fact or a fragmentary series of facts or actions; since it would be virtually impossible and very improbable that each and every one of the mentors would fully gather the complex virtues attributed to the significant teaching figure, having abstracted them from the specific diversity of their enunciation, from their personal coincidences and dissidences. However, there are specific teachers who, in fact, bring together many of them; and, on the other hand, in the totality of mentions, what is common among these categories or what links others is presented.

It is clear that there are communicating vessels and dissolution of frontiers between categories; however, a very clear and revealing theoretical scheme is stabilized. In this same sense, the category called PASSION-TASTE-UNIQUENESS is one of the most imprecise, since it was difficult to synthesize the conceptual or abstract nature of this attribute, when referring to that latent I *don't know what* in the heart of the significant teaching figure. In the graph, this category occupies the smallest visual area; it is quite possible that this is due to the fact that its semantic attributes refer to *higher virtues* that go beyond *being a teacher* per se, although they are closely linked to the rest of the symbolic components.

At the level of fusion and abstraction of the expressive diversity at which we now arrive, it is insisted that it is not possible to achieve each and every one of the fields of teaching "personality", in a literal or specific sense, nor its quantitative measurement; since the scheme presented here is a symbolic construct, an *idea*, an ideal. The symbol is a seed that accounts for the diversity of possible interpretations and, in this case, for the multiple references to concrete subjective entities, to human beings of flesh and blood, whose actions, in synthesis, orbit around these *great* human qualities, related to values and virtues.

Table 2

Archetypes and symbolic conception of meaningful teaching.

#	Arch-type	Attribution	Symbolic conception
1	The strategist	Active teaching	Experimental and practical. Analytical and collaborative teaching. Exemplary and contextual teaching.
2	The wise man	Knowledge and dedication	Knows (is wise), is focused on his subject, dedicated and well prepared. He knows not only his subject, but others, all subjects. He knows how to teach and prepare his class; he shares "something that lives", in terms of his wisdom, his intelligence, his knowledge of the path to a trade and of life itself. He leads by example by exercising order, study and congruence.
3	The warrior-priest	Demand and discipline	Strict; it comes to pressure, stress and provoke adrenaline because of its demands, since it seeks the establishment of a series of values to face reality, be realistic with the difficulties to come and achieve a good future: discipline, responsibility, respect, order, attention, compliance, constancy, attendance, punctuality, commitment, self-demand and sense of duty; focus on a goal: to have good grades, to be good at what they do. He scolds, sets limits and rules: "brings us short", "does not let go of the rein"; which is valued when accepting the youthful tendency to disorder; it is for the good, in order "not to be mediocre or good for nothing".
4	The counselor	Empathy and reliability	Helps, advises, encourages, attends, understands, listens, understands and supports. He is empathetic, honest, trustworthy, understanding and caring. "He lets you be the way you are" -as long as you comply, that is. At times she becomes almost "a friend" or a sort of therapist. Supports other educational activities of interest outside the classroom: chess tournaments, dance rehearsals or sports practices; in situations of vulnerability, pregnancy or illness, flexible delivery times and spaces for the integral development of the activities.
5	The guardian	Academic perseverance	Patience and sensitivity in explaining academic subjects. He explains in detail, step by step, in a variety of ways; over and over again to exhaustion, in and out of class. It seeks understanding by various means.
6	The power giver	Empowers and encourages	Empowers, encourages, encourages. Motivation to succeed in the face of adversity; overcoming exclusion, fears, shyness and laziness; for example: "You can"; it empowers or encourages empowerment.
7	The crazy - friendly	Pleasant and dynamic	It possesses vital energy, enthusiasm; it "is moved" and moves. The tone, volume and intensity of his voice stand out. He is lovable -susceptible to be loved-; kind: "good vibes". Pleasant, cheerful, playful, amusing, joking, satirical and... Crazy: sometimes he or she "goes goats", is cheerful and light-hearted.
8	The deity	Admirable and unique (uniqueness)	Unique, special, passionate. It manifests a dedication that guides, excites, inspires, influences, transmits a desire to learn. An interesting, admirable, exemplary, respectable, memorable and celebrated figure; he is impressive, charming and attractive (beauty), radiates love ("it is a real love"). It is unclassifiable, charming and incredible. It is a "she is a master-teacher" (master among masters). It guides, inculcates, initiates and inspires -inwardly-; therefore, it is even conceived as a God.

Table 2 presents the archetypes resulting from the discussion between the graph and the various discursive containers. In the analysis, the concept of *symbolic composition*arises, when we realize that the *pay* allows us to *observe*, literally, the *compounds* of a *body*; in this case, of a conceptual *entity* , a social *actor* , a symbolic *actant* arising from the mixture and abstraction of the *collective voice*; which does not omit diversity, but rather, precisely, incorporates it by abstracting it into large symbolic subcategories that evoke the *common*sense and feeling. Given the rigor of the analysis procedure and its mixed wink, it is possible to establish these categorizations as symbolic components.

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also shows a root or a meeting point between the diversity of tendencies. The symbol, then, is an inclination, a tendency or *integral* disposition towards these virtues, rather than a single fact or a fragmentary series of facts or actions; for it would be virtually impossible and very improbable that each and every one of the flesh and blood persons would fully gather the complex virtues attributed to meaningful teaching; having abstracted them from the specific diversity of their enunciation, from their personal coincidences and dissidences. However, there are specific teachers who, in fact, bring together many of them; and, on the other hand, in the totality of mentions, what is common among these categories or what links others is presented.

Among these specificities of the discourse, there are cases where it is expressed that the same teaching figure may be loved by some and repudiated by others; at some point the one, at some point the other: "It is hated by many, but valued by many as well, because it is very demanding", Therefore, we are invited not to fall into the temptation of the stereotype, but to stay in the dimension of the archetype. It is not possible to "train" a teacher to develop these values; not in the literal or fragmentary sense, at least. It has more to do with processes and life projects; and, in any case, with continuous training. The teachers themselves, cited here only as a reference for what has been said, insist in asking not to be labeled.

When asked how to train or motivate other teachers to be or act like them, they expressed that it is transmitted by *contagion*; they also emphasize that it is not possible to "qualify" the processes of formative and cultural interaction with the students, since they take place in "the intimacy of the classroom", in the relationship itself, in the evolution of the common journey; and only from there is it possible to *evaluate* or, rather, to assess. Another element that makes us think about the difficulties experienced when implementing distance education during the pandemic, where personal interaction was completely lost; in this sense, the symbiosis in movements, gestures and corporal and non-verbal expressions had already been observed, where students emulate attitudes of their significant teachers, especially when referring to academic and life concepts that these figures instilled in them.

The strategist: active teaching

The allusion to the type of teaching implemented by the significant teaching figure presents more area, since in the preliminary evaluation it is a topic of interest raised *a priori*. However, precisely because of the number of mentions tracked, subcategories are opened here, with the intention of balancing this bias and contributing to the discovery of three major archetypes of teaching: *exemplary and contextual*, *experimental and practical*, *analytical and collaborative*.

It is called *active teaching* from the student perspective, when talking about the deployment of *actions* that go beyond the dictation or the mere reading of texts -commented as a counterpart, but not devoid of its own meaning in the *active logic*-; approaches where one creates, experiments, analyzes, exemplifies, discusses, travels, lives together, talks, acts, dances, produces, thinks, reads, reflects, laughs, participates, exposes, executes, solves, practices, exercises, moves... In short: motor, social, mental and cultural activity; with respect to the "knowledge" or the knowledge that is intended to be inculcated.

Exemplary and contextual teaching presents the smallest area; due, perhaps, to the difficulties in activating study trips or attending conferences; since, certainly, it implies the deployment of economic, logistical, management and time resources and, of course, human resources.

On the other hand, *experimental and practical teaching* has a very similar area to *analytical and collaborative*teaching; perhaps because they can be activated from the basic resources of the campuses. This diversity of practices is related to the nature of the disciplines of study. The following is the extraction of keywords extracted from each subcategory.

Table 3
Archetypal active teaching activities

TEACHING	RELATED ACTIVITIES
Exemplary and contextual	Field trips, attendance at conferences and artistic events, projects, observation, real life examples.
Experimental and practical	Experiments, practices, construction of apparatus and models, workshops, exhibitions, staging.
Analytical and collaborative	Interrogative method or triggering questions, systematic and orderly explanation, reading, essay, analysis and teamwork, case studies.

Although the theoretical categorization is achieved, it is necessary to observe that there are important divergences in terms of methods, personality and teaching positions that, nevertheless, coincide in being positively valued by the student body. This shows that the archetypal background of this teaching figure is beyond the didactic method, although it contains it. This is evident when analyzing the topic of *exigency and discipline*, as an attribute of a significant teacher, appearing in 32 discursive extracts; versus the one related to *pleasant and dynamic* (play, joke, laughter*)*, with equal mentions. On the one hand, not every*strict teacher* is a *joker* or *flexible* , nor vice versa; on the other hand, there are many cases where there is a coincidence between both characters in the same teaching figure, which is also related to the pedagogical-didactic approach.

Discussion and conclusions

The current study focuses its attention on the heroic path taken by students in their transit through EMS in the State of Querétaro, Mexico; however, it also takes into account some characterizations of teachers, provided by the same student group, also related to the heroic path taken by some teachers in their eagerness to achieve the interest and learning of their students.

In this regard, it is important to highlight some details. There are committed teachers, who make their practice their life project, and those who were immersed in the system and only "comply" with the work for which they are hired. Regarding the former, it is important to note that, as Piaget says, they take into account that their main goal is to do new things, they have the idea that they work with a creative humanity and that it is important to form critical minds, which is what the teachers participating in the study point out. To achieve such an undertaking, the teacher must be enthusiastic, love what he or she does, be interested in getting the students engaged in learning and in the subject; that is, take into account their way of learning, how they have been learning (their cognitive structure) and how they relate the new knowledge, which will enrich not only their understanding but also their way of learning: this makes teaching meaningful. But the paths are diverse, depending on the preparation, the theoretical basis used, the goals set... This is related to what Coll (1999) calls *pedagogical help*, in which diverse strategies are used to favor the learning process.

With the study, regarding the learning and teaching process, it is important to note that both mentors and students manage to categorize and point out important

divergences in terms of methods, personality and teaching positions; but they coincide in the archetypal background of these figures, the human sense, which includes the didactic method. This is manifested by rescuing specificities in the discourse of both teachers and students. According to the student collective, *demand and discipline* are placed as opposites, but they also complement the *pleasant and dynamic*topic (play, joke, laughter*)*; which establishes a thread with the pedagogical-didactic approach assumed. Or in the case of teachers, when they express that their way of acting is transmitted by *contagion*, it is emphasized that it is not possible to "qualify" the processes of formative and cultural interaction, since they happen in "the intimacy of the classroom", in the interaction itself, in the evolution of the common path; and only from there it is possible to assess where personal interaction shows how the students imitate attitudes of their significant teachers, as well as refer to academic and life concepts that these figures instilled in them.

In addition to the actions proposed in the study, it is important to follow up on this practice in order to adapt the process generated by the intervention, inform colleagues about the didactic structure used and rotate the project and the knowledge, so that teachers become aware of their practice (Sanjurjo and Vera, 2001), and perhaps infect their colleagues.

Specifically, learning, as well as meaningful teaching, are closely related to what Piaget proposes with the concepts of *balancing* and *adapting*; with balancing knowledge and the way of learning or unbalancing the structure that one possesses in order to make the change, achieving new cognitive structures. This is what Caramón (2019) alludes to when proposing how to work the ideal strategies for the group and the individual at that moment, where factors such as interrelation, affectivity, concerns and dreams must be considered, contributing to the formation of identity (as proposed in the study of archetypes), in order to achieve the leveling of learning channels and lateralities in their way of approaching knowledge; which acquires meaning both for the students and for the teaching figure: it engages them.

Thus, it is possible to affirm that in the evaluation of school permanence, the manifestations that are significant from the point of view of the young people themselves, for them, there is not only one way of being a significant teacher, if they are compared, there are as many as theoretical supports and projections of each actor and, with this, as already pointed out, in teaching and learning, the teacher becomes a figure that impresses, knows, is enthusiastic, shows energy or passion; someone who *loves*... Loves his subject, loves to teach, loves to be with the student body: speaks of the need to consider teaching as a life project.

If one were to elaborate the mythical story, one could not speak of a master, but rather of a variety of characters or possibilities that the student community may encounter on its heroic journey.

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DEVELOPMENT OF EMOTIONAL INTELLIGENCE IN PRESCHOOLERS WITH ADHD: A CASE STUDY IN AN EDUCATIONAL CENTER IN MANTA-MANABÍ-ECUADOR

DESARROLLO DE LA INTELIGENCIA EMOCIONAL EN PREESCOLARES CON TDAH: UN ESTUDIO DE CASO EN UN CENTRO EDUCATIVO DE MANTA-MANABÍ-ECUADOR

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ABSTRACT

This research focused on the significance of emotional education in preschoolers with ADHD in an educational center in Manta-Manabí-Ecuador. The aim of this study was to contribute to the improvement of emotional intelligence in a child with Attention Deficit Hyperactivity Disorder (ADHD), as a way of promoting comprehensive development and proposing strategies to work on emotional self-control in preschoolers. A quasi-experimental case study was conducted using a qualitative, exploratory, descriptive, and applicative approach. The study involved a 4-year-old boy with ADHD who attends the educational center and displays hyperactivity traits. The child does not participate in activities voluntarily and takes what he wants with some aggression. Information was collected through a semi-structured interview, a behavior questionnaire based on the Conners scale of emotional intelligence, and the analysis of experiences during personalized attention sessions with the student. The results showed significant improvement in emotional intelligence indicators in the child. This study contributes to the enhancement of emotional education in preschoolers with ADHD and highlights the importance of working on emotional self-control and comprehensive development. The findings of this research could be useful for other educational centers and professionals who work with children with ADHD and other emotional difficulties.

Palabras clave:

RESUMEN

La presente investigación se enfocó en la importancia de la educación emocional en preescolares con TDAH en un Centro Educativo de la ciudad de Manta-Manabí-Ecuador. El objetivo fue mejorar la inteligencia emocional en un niño de 4 años con TDAH, a

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inteligencia socioemocional, primera infancia, TDAH, educación emocional.	través del desarrollo integral y el trabajo en el autocontrol emocional. Se llevó a cabo un estudio de caso cuasi-experimental utilizando un enfoque cualitativo, exploratorio, descriptivo y aplicativo. El participante fue un niño con TDAH que presenta rasgos de hiperactividad y no participa en actividades de manera voluntaria, mostrando cierta agresividad al tomar lo que quiere. Se utilizó una entrevista semi-estructurada, un cuestionario de conducta basado en la escala de Conners de inteligencia emocional y el análisis de sesiones de atención personalizada al estudiante para recopilar información. Los resultados indican una mejora significativa en los indicadores de inteligencia emocional del niño. Este estudio aporta al mejoramiento de la educación emocional en niños con TDAH y destaca la importancia del trabajo en el autocontrol emocional y el desarrollo integral en preescolares. Los hallazgos de esta investigación podrían ser de utilidad para otros centros educativos y profesionales que trabajan con niños con TDAH y otras dificultades emocionales.

Introduction

Attention Deficit Disorder (ADD) is a neurobiological health problem that affects a large number of children, especially boys, and can manifest itself from an early age. The exact cause of ADD has not yet been clearly identified, but it is believed that a combination of genetic and environmental factors may be responsible. Children with ADD have difficulty maintaining attention and impulse control, which can lead to academic, behavioral and relationship problems. According to international statistics, ADD is a public health problem, as it can have serious consequences in the lives of affected children, such as low self-esteem, depression and anxiety (Tuirán, 2021).

In addition, in Latin America, Autism Spectrum Disorder (ASD) can also lead to ADD. According to statistical data, the incidence of ASD in Latin America is 2.2%, of which 17.8% are preschoolers (Tuirán, 2021). This indicates the need for greater attention and care for children with ADD. Parents and healthcare professionals should be aware of the signs of ADD and seek early help to ensure the child's well-being.

Therefore, in Ecuador, it is necessary to strengthen emotional education in students in order to achieve an adequate medical, psychological and pedagogical diagnosis and treatment for children with ADD. Emotional education can also be useful in improving the relationship between students and fostering a healthy and positive learning environment. By strengthening emotional education, children can be helped to develop valuable skills that enable them to face life's challenges and develop optimally (García and Domínguez, 2014).

The purpose of the present research was to improve the emotional intelligence of a four-year-old child with ADHD through a comprehensive approach focused on emotional development and strengthening self-control. To this end, a quasi-experimental case study was carried out using a qualitative, exploratory, descriptive and applicative methodology.

This work is part of a broader research conducted in the context of the Master's Degree in Basic Education of the Postgraduate Unit of the Universidad Laica Eloy Alfaro de Manabí. The focus of the research was on the development of emotional skills and impulse control in a child with ADHD, in order to improve his quality of life and academic performance.

Attention Deficit Disorder

ADHD is characterized by consistently poor emotional self-regulation and a tendency toward impulsivity (Barkley and Murphy, 2010). These difficulties can manifest themselves in different ways depending on the child's stage of development, with hyperreactivity, oppositional behavior, tantrums and inattention being more prevalent at preschool age (Rusca and Cortez, 2020).

The specialized literature generally employs a historical argument from children's literature to defend the diagnostic validity of ADHD. In Dr. Heinrich Hoffman's work "Pedro Melenas" we find a character with characteristics very similar to ADHD. However, upon researching those same historical sources, one can see how unjustified that argument is (de Vinuesa, 2017).

Garcia (2017) presents a historical overview of ADHD from the 18th century to the present. The following milestones are highlighted according to:

- In 1763-1856, the Scottish physician Alexander Crichton described "pathological inattention" as an inability to sustain attention.

- In 1809-1894, the German psychiatrist Heinrich Hoffmann created the character "Restless Philip" to represent inattention and easy distraction in the face of strange obstacles.
- In 1868-1941, British pediatrician George Frederic Still described "moral control deficiency" as a common feature in male children with impulsivity and inability to maintain attention.
- In 1930, the term "hyperkinetic infantile disease" was coined to describe the marked motor restlessness.
- In 1937, American psychiatrist Charles Bradley revolutionized the treatment of ADHD by using the stimulant drug Benzedrine.
- In 1954, methylphenidate was developed and is now recognized as the most effective psychostimulant for the treatment of ADHD.
- In 1960-1968, the DSM-III first included the term "infantile hyperkinetic reaction" in its diagnostic manual, based on direct observation of the child's behavior rather than looking for a neurological cause.
- In 1970, the DSM-III changed the name to "attention deficit disorder" and recognized that ADHD could present in two types: with or without hyperactivity.
- In 1990, the DSM-IV identified three subtypes of ADHD and recognized that the disorder persisted into adulthood.
- ADHD is currently characterized by a list of 18 symptoms divided between inattention and hyperactivity/impulsivity, and is described as a persistent pattern that interferes with functioning and development.

ADHD itself is a multifactorial neurobiological disorder with a genetic basis and high heritability. In addition, several neuropsychological factors are implicated in ADHD (da Silva and Rodrigues, 2022). Although the exact cause of ADHD is unknown, there are several factors that may contribute to its onset. For example, some studies suggest that ADHD may be related to childhood history of abuse or neglect, different situations of adoption, foster care, exposure to neurotoxicants, infections, exposure to drugs in utero, low birth weight, and mental retardation.

ADHD is divided into three subtypes: predominantly inattentive, predominantly hyperactive-impulsive and combined (Thapar et al., 2012). Children with ADHD often exhibit manifestations such as emotional outbursts, low frustration tolerance, authoritarianism, stubbornness, excessive and frequent insistence on having their requests met, emotional lability, demoralization, dysphoria, frustration and peer rejection, and low self-esteem. Academic performance is often affected, leading to conflicts with family and teachers. In addition, they may present oppositional defiant disorder or dissocial disorder (Presentation et al, 2009). All this can affect their daily life and their relationship with others, as inattention, hyperactivity and impulsivity determine limitations in the context where they live and in the coping mechanisms they develop (Masó, 2016).

It is important to note that ADHD can be diagnosed in children as young as 4 years of age (Sanchez et al., 2022). While some children may outgrow the symptoms as they grow older, others do not and may continue to experience difficulties into adulthood. Therefore, early detection and appropriate treatment in the psychological support of children, adolescents and adults from all social, cultural and racial backgrounds is essential (Silva and Rodriguez, 2022).

In its most severe form, ADHD can be extremely disruptive and affect social, family and school adjustment, as its symptoms can affect multiple areas of an individual's life (Tuirán, 2021). In particular, inattention, hyperactivity and impulsivity can limit the

performance of children with ADHD in social, family, emotional and educational settings, which can affect their ability to establish healthy interpersonal relationships and develop coping mechanisms (Masó, 2016).

The impact of ADHD on the person can vary from one individual to another, depending on several factors, such as the severity of symptoms and the quality of treatment received. In some cases, ADHD can be severe enough to affect a child's ability to function in school and in society in general, which can have long-term consequences in terms of his or her emotional well-being and future academic and job performance.

Early detection and appropriate treatment of attention deficit hyperactivity disorder (ADHD) are essential to improve the quality of life and social adjustment of affected children. If not detected early, ADHD can have serious consequences, such as low self-esteem, depression, anxiety, conduct disorders, oppositional defiant disorder and antisocial behaviors (García and Domínguez, 2014).

To make a diagnosis of ADHD, it is considered that symptoms must persist for at least 6 months, with a maladaptive and inconsistent intensity in relation to the individual's developmental level, and at least six of the following symptoms must be present: problems in attention management, difficulty maintaining attention, hyperactivity, impulsivity, and lack of coordination (Chaadd, 2018).

However, the major problem in the diagnosis of ADHD lies in the need to differentiate it from overactivity secondary to anxiety or depression (Amezquita et al., 2020). In these cases, hyperactivity is often accompanied by fears, worries, sleep disorders or nightmares (Alvarez et al., 2019). Therefore, it is important for mental health professionals to conduct a comprehensive evaluation to be able to differentiate between different disorders that may present with ADHD-like symptoms.

Adequate and timely treatment is important to lessen the outcome of this disorder, as parents of children with ADHD often feel overwhelmed, being exposed to constant censure. Although the style of upbringing and the education received are not the origin of the disorder, they do contribute to aggravate the symptoms.

Treatment of ADHD is usually multidisciplinary and includes pharmacological therapy, psychological therapy, and lifestyle and dietary changes (Rusca and Cortez, 2020). In addition, emotional education can also play an important role in the treatment of ADHD. Through emotional education, children can learn to recognize and regulate their emotions, which will allow them to improve their academic performance and social adaptation (Fernandes et al., 2017).

Treatment of ADHD may include both psychological therapy and medication. Psychological therapy can help children develop social and emotional skills, learn impulse control and improve their ability to concentrate. On the other hand, medication can help reduce ADHD symptoms and improve the academic and social performance of affected children (García and Domínguez, 2014).

It is important to note that the future of children with ADHD is not clearly determined, as some may outgrow their symptoms as they grow older, while others may continue to have problems into adulthood. Therefore, it is crucial that children with ADHD receive appropriate treatment as early as possible to minimize the negative impact of the disorder on their lives (Garcia & Dominguez, 2014).

Emotional intelligence

Emotional intelligence (EI) is a concept that has emerged from the need to understand why some people have a better adaptation to the various situations that arise in everyday life, and whether IQ (IQ) is the only factor that determines our destiny (Cabas et al., 2017). In this sense, it has been shown that emotions and feelings encompass

various cognitive abilities that are grouped under the term EI, which is composed of five main competencies: knowledge of one's own emotions, the ability to control them, the ability to motivate oneself, recognition of the emotions of others, and the ability to manage interpersonal relationships (Rey, 2012).

The concept of emotional intelligence has gained great importance in today's society, where the aim is to develop skills that allow people to face the challenges of everyday life efficiently. Emotional intelligence is considered an ability that allows us to adapt to the environment and relate appropriately with others, overcoming the limitations that IQ may present. In other words, emotional intelligence focuses on the knowledge, regulation and expression of emotions, being a key element in human development and in the formation of people's character. In addition, emotional intelligence is composed of different competencies that are interrelated and can be developed throughout life, allowing people to improve their skills and strengthen their ability to face life's challenges more efficiently.

In education, it is essential to offer children experiences that allow them to learn to better manage and control their emotions from an early age, as this fosters their emotional development, which is crucial for their optimal human growth (Alpízar, 2019; Dueñas, 2002). Parents, the environment and teachers play a key role in the formation of children's character and in the development of their emotional intelligence (Díaz, 2013).

Nowadays, emotional education is a key element in the educational process and in human development in general. The aim is for children to acquire the necessary skills to recognize, understand and manage their own emotions and those of others, which will enable them to function effectively in different social and emotional contexts throughout their lives (Fernández and Extremera, 2008).

The main objective of emotional education programs is to foster students' ability to understand and regulate their emotions, as well as to develop effective interpersonal skills. These programs are based on the idea that emotional intelligence is a crucial aspect of academic and personal success (Goleman, 2011). Emotional education involves teaching skills such as emotional self-awareness, emotional regulation, empathy and the ability to relate effectively with others (Boix, 2007).

In addition, emotional education also has a positive impact on the mental health of children and youth. By learning to recognize and manage their emotions, students can reduce anxiety, stress and depression, and improve their emotional well-being (Fernandez-Berrocal and Extremera, 2008). Therefore, it is important that emotional education programs are incorporated into the school curriculum in a formal and systematic way so that students can develop these skills from an early age and carry them with them throughout their lives.

It is important to note that emotional intelligence is not a new concept, as it has been a topic of great interest in the educational and professional world during the last decades. Howard Gardner's theories of multiple intelligences (Goleman et al., 2011) and Robert Sternberg's triarchic theory of intelligence are antecedents of emotional intelligence (Trujillo, 2005). Likewise, the maturation of the body, mind and emotions is a prerequisite for acquiring self-control and emotional regulation (Goleman, 2011).

From infancy, children are aware of their emotions and begin to recognize the emotions of others and their causes (Boix, 2007). Therefore, parents and teachers should play an active role in the development of children's emotional skills from an early age (Julca, 2021). The ability to control one's own actions is important for the child to be able to deliberately choose what is best for him or her and to develop emotional skills that allow him or her to establish strong emotional bonds (Fernandez and Garcia, 2016). In addition, the positive or negative reprimands that the child receives influence the

formation of his ideals and aspirations, which will later be his guide for life (Fernandez and Extremera, 2005). In short, the development of emotional intelligence from an early age is essential for the personal and social growth of children.

Emotional education is a crucial tool for improving coexistence in the classroom and the integral development of students. Children with ADHD have difficulty maintaining attention and impulse control, which can affect their academic performance and their relationships with other classmates. Therefore, emotional education is necessary to strengthen students' social skills and help them develop emotional self-control. In addition, emotional education can also be an effective tool to help children with ADD develop self-esteem and self-confidence, which can improve their academic performance and overall quality of life (Fernandes et al., 2017).

Method

Design

The present study is framed within the quasi-experimental paradigm, which allows for a deeper and more rigorous analysis of the variables involved. In addition, we have opted for a qualitative model with a descriptive and applicative approach, which seeks to identify and describe situations and predominant attitudes in a specific context. In this way, it is expected to obtain detailed and accurate information about the intervention process carried out on the child with attention deficit disorder.

The use of a descriptive approach makes it possible to identify the characteristics and particularities of the situation under analysis, as well as the processes and attitudes involved. In this way, a deeper understanding of the object of study is achieved, which in turn allows the generation of intervention proposals that are better adjusted to the specific needs of the child with ADHD.

The main objective of this study is to provide tools for the ADHD child to apply self-control through emotional intelligence. It is known that children with this disorder have difficulty regulating their emotions and behaviors, which can negatively affect their social-emotional development. Therefore, the implementation of early intervention strategies, based on emotional intelligence, can help improve their ability to recognize, understand and regulate their emotions.

This case study focused on a four-year-old boy, to be named Leo, diagnosed with Attention Deficit Hyperactivity Disorder. Choosing a specific case allows for a more detailed and rigorous analysis of the processes and intervention strategies used, which facilitates the identification of the strengths and weaknesses of the intervention proposal and allows for necessary adjustments to be made in the future.

Instrument and procedures

In the framework of this study, we chose to use the Conners Behavior Questionnaire (1994) as a reference to detect the aptitudes and attitudes of the child with ADHD. For this purpose, detailed observations and a semi-structured interview applied to the parents at the beginning of the therapy were carried out. These techniques made it possible to gather valuable information on behavior and emotions. From the results obtained, a personalized therapy plan could be designed to help Leo develop his emotional skills and improve his capacity for self-control.

To encourage parental collaboration, an informed consent form was signed and an agreement was established in which the parents agreed to support the child at home in the development of self-control and breathing skills, as well as in the elimination of

inappropriate habits. The presence of disorders such as hyperactivity, attention deficit, impulsivity, conduct disorders and learning difficulties can have a negative impact on the school performance of any child, so it is important to address them in a comprehensive manner.

To learn about parents' understanding of ADHD and facilitate the therapeutic process, an initial interview was administered consisting of five brief questions about (1) parents' general understanding of ADHD, (2) the main concerns or challenges they face with their child, (3) the strategies they have used so far to manage their child's behavior, (4) their knowledge about emotional intelligence and its relationship to ADHD, and (5) their willingness and ability to actively support therapy at home. This initial approach created an atmosphere of trust and established a positive relationship between the parents and the therapist, which facilitated the gathering of information and working together in the child's treatment.

Results

Case description

This study examined the case of a 4-year-old boy, who will be given the pseudonym Leo. Leo is the only child of young, professional parents, and according to his parents' assessment, his family environment is considered optimal. However, parents reported that he presents some characteristics that concern them, such as a language of his own that only they can understand and a lack of eye contact. In addition, the child shows an explosive and hyperactive behavior, without control of his actions, even throwing objects and being aggressive in taking what he wants.

Leo spends most of his time with his paternal grandmother because his parents work all day. At home, he generally obeys his father's orders, but only attends to calls when he wants to. His ability to concentrate is momentary and he is not distracted by the sounds of the street or the noises of the blender. Although he tolerates the presence of other people, he is not sociable, and does not know about turns when playing.

At school, Leo attends the second level of kindergarten in a private educational institution. Although he is very intelligent and knows the letters of the alphabet, he does not like to get dirty or wet, and has difficulty with activities such as tearing, cutting or painting. In addition, he shows little interest in class activities. The teacher indicated that her attention is scattered, she does not follow routines and manifests echolalia and anxiety.

Concerned about Leo's behavior, his parents took him to a psychologist who performed clinical tests and diagnosed him with ADHD. The specialist suggested taking him to a personalized center for comprehensive help, where he was given the Conners Behavioral Questionnaire (1994) to evaluate his behavior. The results of this evaluation will be presented below.

Intervention and data recording protocol

The designed intervention consisted of a series of personalized private sessions with a duration of three months, applied with a frequency of one hour per day, twice a week. During these sessions, specific objectives were set and appropriate materials were used to describe and carry out activities that would allow the acquisition and development of emotional intelligence. Habits were also encouraged to achieve self-control and autonomy in the preschooler's daily life.

Table 1 shows the results of the intervention, which consisted of ten basic sessions with specific numbered activities described in a template. In each session, the achievement of each activity was evaluated, starting with a specific objective, the material to be used, description and activities that were applied.

During all sessions, the traffic light technique was applied to observe the child's emotional state at the beginning of the session. With the help of a sign located at the entrance door, the child indicated how he/she was feeling at that moment, chose the respective card and handed it to the therapist. In this way, the child was calmed down before entering the session if he/she arrived with a negative or distracted attitude.

Different techniques were used to maintain the child's interest and predisposition during the sessions. For example, the relaxation and deep breathing technique was taught, with the objective that the child would get to know his diaphragm, learn breathing games and understand the importance of diaphragmatic or abdominal breathing as a control tool for his ADHD. Music therapy, dactylpainting, body expression exercises and breathing control exercises were also used (See Table 1).

Table 1

Intervention activities

Session	Activity
1	Breathing and relaxation games
2	Body expression and breath control exercises
3	Ant technique to be applied in everyday situations
4	Dance therapy with the Vladimir technique
5	Use of a stuffed animal as an affective stimulus
6	Technique of dactylpainting on the body scheme
7	Balloon technique for anxiety control
8	Working on anxiety with feeling cards, story and chameleon game
9	Guided breathing while drawing on paper
10	Relaxation exercises for different body parts

Table 2 presents the results of the Conners Behavioral Questionnaire applied to Leo that assesses different indicators. The data are divided into two time points: pretest (before the intervention) and posttest (after the intervention), and the items are evaluated on a rating scale from 1 to 3, where 1 indicates few or no symptoms, while 3 indicates severe or frequent symptoms. Items assessed include excessive motor restlessness, unpredictable outbursts of temper, distractibility and inattention, frequent annoyance to other children, angry or sullen appearance, sudden mood swings, restlessness and always on the move, impulsivity and irritability, difficulty completing tasks, and easy frustration with efforts.

In the pretest, the child obtained a total score of 25 points, indicating a significant presence of symptoms. However, after the intervention, at the posttest, the total score decreased to 12 points, suggesting a significant improvement in the child's behavior after the intervention. This may be an indicator that the intervention had a positive impact on the child's emotional intelligence development and overall behavioral improvement.

Table 2
Prestest-Posttest Results

Indicator or item	Pretest	Posttest
Excessive motor restlessness	A lot (3)	Quite a lot (2)
Unpredictable explosions of bad temper	A lot (3)	Quite a lot (2)
Distraction and lack of attention	A lot (3)	Little (1)
Frequent disturbance to other children	Quite a lot (2)	Little (1)
Angry or sullen appearance	Quite a lot (2)	Little (1)
Sudden changes in mood	A lot (3)	Little (1)
Restlessness and always on the move	Quite a lot (2)	Little (1)
Impulsivity and irritability	Quite a lot (2)	Little (1)
Difficulty in completing tasks	A lot (3)	Little (1)
Easy frustration of efforts	Quite a lot (2)	Little (1)
Total score (max. 30)	25	12

Among the indicators with the most significant gains were distractibility and inattention, which went from "a lot" (3) to "a little" (1), and excessive motor restlessness and unpredictable outbursts of temper, which went from "a lot" (3) to "quite a lot" (2). There was also a significant decrease in other symptoms such as frequent annoyance to other children, angry or sullen appearance, sudden mood swings, restlessness and always on the go, impulsivity and irritability, difficulty in completing tasks, and easy frustration with efforts, all moving from "quite a lot" (2) or "a lot" (3) to "little" (1). Overall, the intervention was able to significantly improve the child's symptoms in all indicators assessed.

To test the effectiveness of the intervention, a statistical analysis of each indicator was carried out using the Wilcoxon test. The results showed a significant improvement in the posttest compared to the pretest ($Z = -2.83$, $p = 0.005$), suggesting that the intervention had a positive impact on the child's symptoms. It is important to note that the Wilcoxon test is a statistical tool suitable for evaluating nonparametric data and is used to determine whether there are significant differences between the medians of two related groups. Summing the ranges of the positive and negative differences, it is concluded that the improvement observed in the posttest was significant compared to the pretest.

Discussion and conclusions

The results of this study demonstrate that personalized educational intervention had a significant effect on improving the behavioral and emotional symptoms of a child with ADHD. Specifically, a significant decrease was observed in excessive motor restlessness, outbursts of temper, distractibility and inattention, frequent annoyance to other children, angry or sullen appearance, sudden changes of moods, restlessness, impulsivity and irritability, difficulty in completing tasks and easy frustration of efforts, according to Conner's behavior scale (1994).

It is important to highlight the importance of early diagnosis and personalized educational intervention to improve behavioral and emotional symptoms in children with ADHD (Rusca et al., 2020). In addition, it is essential to tailor the intervention to the specific needs of each child and work in collaboration with health and education

professionals to provide them with the tools and support necessary to reach their full potential academically and socially (Julca, 2021).

The literature review and the results obtained in this study agree that emotional intelligence is a capacity that encompasses different cognitive and affective skills (Tuiran, 2021). To develop emotional intelligence in children, interventions should be adapted to their needs, improve their ability to control their anxiety, improve their mood and encourage habits through routines (Trujillo, 2005).

The personalized work of three months with a frequency of one hour daily on two days per week, in which objectives were applied, the handling of materials, the description and realization of activities through exercises and techniques at home and at school, achieved a significant improvement in the acquisition and development of emotional intelligence of a preschooler with ADHD (Amezquita et al., 2020).

The importance of emotional education to form more responsible people and develop emotional intelligence in a positive way is highlighted (Alpízar, 2019). The education of feelings is a guarantee to have a happy life and to resolve conflicts through empathy (Presentación et al., 2009). By teaching children to develop their emotional intelligence, future problems are avoided and their development is favored, as they have the sensitivity and control of their emotions (Fernandez, 2014).

In conclusion, it is essential to nurture the aspects that contribute most to the development of preschoolers' personalities through the family, educational-therapeutic and social environments in general, in order to continue developing emotional intelligence in a positive way. It is important to set limits and nurture all cues a child receives through positive effort. Emotional education is crucial to better adapt to the social world and make more informed and balanced decisions in our lives.

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CURRENT STATUS OF THE PROFILE OF TEACHING SKILLS IN ARTICULATION WITH THE LEARNING OUTCOMES OF PRIMARY SCHOOL STUDENTS IN THE DOMINICAN REPUBLIC

CARACTERIZACIÓN DEL DESARROLLO DE LAS COMPETENCIAS DOCENTES EN MAESTROS DE EDUCACIÓN PRIMARIA EN LA REPÚBLICA DOMINICANA

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ABSTRACT

This article presents the results of an investigation about the profile of teaching competencies, within the framework of a study on its articulation with the learning of primary school students in the Dominican Republic. The objective was to characterize the current state of professional teaching skills for the work of teachers with the primary education curriculum that allows its articulation with the learning outcomes of students at this level. A mixed methodological approach was used that integrated the analysis of quantitative and qualitative data from the opinions of teachers and experts, through the analysis of data from the documentary review technique, the questionnaire and the method of analysis by expert criteria. The research identifies training needs that emerged in an emergent way due to the appearance of COVID-19 and that urgently need to be incorporated into teacher training processes, to promote the application of the components of the curricular design at the primary level. The limited technological competence makes it difficult for teachers to educate new generations and take advantage of the potential of a growing digital life environment.

Palabras clave:
competencias docentes, perfil profesional, currículum, escuela primaria.

RESUMEN

En este artículo se presentan los resultados de una investigación acerca del perfil de competencias docentes, en el marco de un estudio sobre su articulación con los aprendizajes de los estudiantes del nivel primario en la República Dominicana. El objetivo fue caracterizar el estado actual de las competencias profesionales docentes para el trabajo de los maestros con el currículo de la educación primaria que permita su articulación con los resultados de aprendizaje de los estudiantes de este nivel. Se utilizó un enfoque metodológico mixto que integró el análisis de

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	datos cuantitativos y cualitativos de las opiniones de docentes y expertos, mediante el análisis de los datos de la técnica de revisión documental, el cuestionario y el método de análisis por criterio de expertos. En la investigación se identifican necesidades de formación que surgieron de manera emergente por la aparición del COVID-19 y que urge sean incorporadas en los procesos formativos docentes, para impulsar la aplicación de los componentes del diseño curricular del nivel primario. La limitada competencia tecnológica dificulta el desempeño docente para educar nuevas generaciones y aprovechar las potencialidades de un creciente entorno de vida digital.

Introduction

Currently, teachers around the world, particularly in the Dominican Republic, are facing an educational scenario impacted by the health crisis that generated the COVID-19 and led to social isolation measures, which institute complex challenges to the teaching activity. In this scenario, teachers and professors have had to reinvent new ways of teaching and learning, taking into account the optimal combination of face-to-face and virtual modalities, evidencing the limited competencies they possess in a school context mediated by technologies.

This situation demands outlining a profile of teaching competencies for professionals who work in primary level educational centers adjusted to a new reality, since "when the teacher performs in the new teaching and learning environment his or her functions change, so it is necessary to redefine his or her professional task, as well as the competencies he or she must possess" (Colín, 2019, p. 4).

Primary education is an essential period for the physical, psychological and social development of the student based on the construction of knowledge that prepares him/her for future access to secondary education. According to the European University Miguel Cervantes (2022), the primary school teacher plays a fundamental role in this mission, being responsible for producing new learning and developing the intellectual, affective, social and critical skills, among others, necessary for personal success.

Professionals graduating from Dominican universities fail to meet the high expectations regarding their performance and the quality of the learning acquired is questioned by the productive sectors. For teacher training there are theoretical proposals, research and concrete experiences that can contribute to the design of curricula for initial training (Castillo, 2013). Therefore, there is a need to evaluate the preparation being offered to teachers and, more importantly, how the agents involved themselves are doing in order to introduce the necessary changes.

Teaching competencies have been consolidating in the current educational panorama based on research on their definition (Zabalza, 2003), general classification (Sarramona, 2004), the most important competencies for teachers (Medina, 2009) and those that typify the primary education professional (Martín del Pozo et al., 2009); studies that have become references for approaching this field of reflection in the different educational areas. These investigations have been analyzed in a study published by Nieto et al. (2012), concluding that in the primary education stage, the student is confronted with fundamental learning — mother tongue, introduction to elementary notions of calculus, physical education, scientific observation, notions of history, geography and art, forms of expression such as rhythm, modeling, drawing, handicrafts and manual work— the forms of expression such as rhythm, modeling, drawing, manual work, and finally, the acquisition of fundamental elements of civic and social life that help the integral growth of the child at this stage.

The low results of competitive examinations to select applicants as teachers for the different areas and levels of the Dominican educational system and the insufficient learning achievements of students at the primary level (United Nations Educational, Scientific and Cultural Organization [Unesco], 2019), prove the shortcomings in competency-oriented teacher training and, consequently, their training needs.

The profile of professional teaching competencies, in essence, contains the description of the demands of the primary education level in today's Dominican education. Based on its adequate definition, it will be possible to project lines of action in the area of teacher training and will facilitate the formulation of other criteria to guide the

selection of education professionals (Criollo, 2019). The teaching profile must guarantee improvements to the teaching and learning process in an increasingly complex school network influenced by technologies, projecting the appropriate adjustments that lead to the appropriation of learning demanded by today's society.

According to Cedeño (2012), in order to understand the meaning and difficulties of teacher training in terms of the fundamental competencies that education professionals should have, it is necessary to analyze the demands that give rise to this transformation. It is a concern of the education sector to analyze the fundamental competencies and the professional profiles of teachers that favor the development of other competencies specific to their context.

Stern's (2020) asserts that today's teachers face a great challenge, which involves breaking the paradigm of what school is today, since it is necessary to reorient classes so that the transfer of learning is at the heart of teachers' work. This change is not so difficult to achieve, being possible by reorienting the current curriculum or otherwise restructuring the school to make it happen.

Consequently, modifications to the profile of teaching competencies and to the training processes have their starting point in the knowledge of the level of development of these competencies. Thus, the objective of this article is to characterize the current state of professional teaching competencies for the work of teachers with the primary education curriculum that allows its articulation with the learning outcomes of students at this level, as part of a larger study that the first author deploys within the process for obtaining the degree of doctor in educational sciences.

Method

The unit of analysis or element of study is the primary school teacher in the Dominican educational system. This is a descriptive study for which 566 teachers working in 88 public and private schools in Educational District 06-04 La Vega Oeste were taken as the population. The sample is selected by means of the simple random method of sampling/analysis units, in which all elements of the population have the same possibility of being chosen based on the characteristics of the population and the sample size (Hernández-Sampieri et al., 2014). The research sample consisted of 240 primary school teachers.

The instruments used were the documentary review, the questionnaire and the analysis by expert criteria. The documentary review was used to describe the profile of teaching competencies and teaching performance, information that makes it possible to substantiate the results by contrasting them with existing theory. The documents and research reviewed were as follows:

- Competencias docentes en educación primaria: una revisión de la literatura científica. Revista Internacional de Educación para la Justicia Social, (Riaño and Jimenez, 2019).
- Competencias docentes en educación primaria. Una propuesta de evaluación en México. Revista Electrónica Interuniversitaria de Formación del Profesorado, (De Alba et al., (2019).
- Competencias docentes en educación primaria: un análisis desde las percepciones de los profesionales. Revista Interuniversitaria de Formación del Profesorado, (Riaño et al., 2017).
- Diseño Curricular. Nivel Primario. Primer ciclo 1ro. 2do. y 3ro. (Ministry of Education of the Dominican Republic [Minerd], 2014).

- Diseño Curricular. Nivel Primario. Segundo ciclo 4to. 5to. y 6to. (Minerd, 2014).
- Estándares profesionales del desempeño para la certificación y desarrollo de la carrera docente (Ministerio de Educación Superior Ciencia y Tecnología [Mescyt], 2014).
- Orden departamental No. 06-2021, que reglamenta el concurso de oposición para la selección de maestros del sistema preuniversitario del Ministerio de Educación (Minerd, 2021)
- El modelo pedagógico del nivel primario (Minerd, 2013).
- Resolución No.11-22, Mediante el cual se reglamenta el Programa Nacional de Inducción para docentes de nuevo al sistema educativo público de la República Dominicana ingreso a la carrera docente (Minerd, 2022).
- Los perfiles de ingreso y egreso para los aspirantes a la carrera de educación primaria (Mescyt, 2015).
- Modelo de evaluación de desempeño docente basado en competencias en República Dominicana (Lemonier, 2013).

The review of these documents contributed to characterize the teacher profile required to implement the pedagogical model at the primary level under the competency-based approach, as established in the curricular design to promote learning improvement, which has lagged behind in the context of the COVID-19 pandemic. The main reference is the teacher performance evaluation carried out in 2017 by the Minerd since it is the last study carried out at the national level due to the situation generated by the pandemic.

A questionnaire was used as an instrument, which was applied to the 240 teachers who made up the study sample, with the objective of characterizing the current state of the teachers' professional competencies for the work of teachers with the primary education curriculum that allows its articulation with the learning outcomes of students at this level.

To test the reliability of the questionnaire applied, a pilot test was conducted with ten teachers and the results were subjected to a statistical test of internal consistency, calculating Cronbach's alpha reliability coefficient, which takes values ranging from 0 to 1, where a coefficient of 0 means no reliability and 1 represents total reliability. In addition, eight qualified specialists in the field were asked to review and validate this instrument, whose contributions and recommendations were taken into consideration prior to its application.

The questionnaire is structured in two sections, the first to obtain general information, both personal and professional; and the second is dedicated to inquire about elements that define the profile of teaching competencies, according to the classification of Mescyt (2014), adopted in the study, i.e. intellectual, pedagogical and technological.

The purpose of the expert analysis was to determine how primary school teachers apply the components of the curriculum design and what technological resources and means they incorporate in their training and educational practice. Ten education professionals with doctoral degrees were selected as experts. With professional experience in teacher training (4), educational supervision (4) or in both areas (2).

The procedure consists of applying the guide during three consecutive rounds, leaving out in each round the questions that coincide, until a consensus is reached on the indicators that will serve as input to design the profile of teaching competencies at the primary level. An ordinal scale is used with categories from one (lowest) to five (highest) and they are asked to rate the state of formation of the competencies of the primary level teacher in each of the three categories that define the competency profile and that are summarized in Table 1.

Table 1
Categories of the competency profile of the primary level teacher

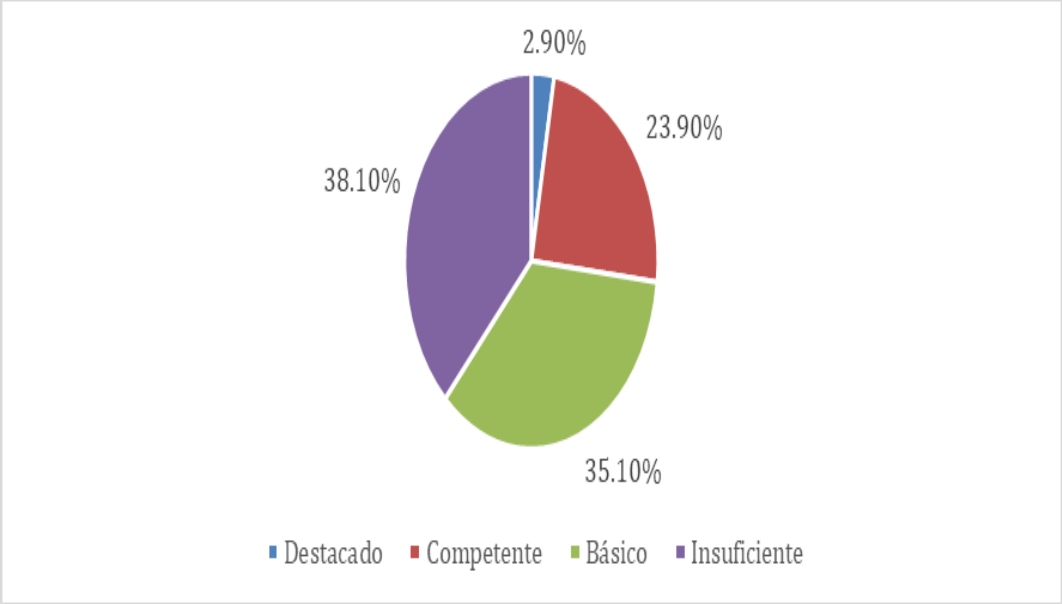
Type of competition	Indicators
Intellectual	A) Level of theoretical and practical knowledge about the competency-based approach established for the primary level. B) Organization of the pedagogical practice taking into account the moments of the class. C) Use of argumentation as a strategy for the development of fundamental and specific competencies established in the primary level curriculum. D) The primary level teacher promotes analysis and synthesis for the comprehension and production of oral and written texts.
Pedagogical	E) Organization, planning and evaluation according to the components of the primary level curriculum design. F) Mastery of the competency-based approach and curricular areas. G) Knowledge and application of curriculum components.
Technological	H) Application of technological resources and means in pedagogical practice. I) Frequency of use of technological means for training.

Results

From the documentary review, the evaluation of teaching performance (Minerd, 2017) is obtained, which allows defining the contribution to the achievement of the professional standards required in the Dominican educational system. Although the baseline study included teachers from all over the country, the present research is limited to regional 06 La Vega and the findings of educational district 06-04 La Vega Oeste, in order to characterize the current state of teachers' professional competencies and teachers' work with the primary education curriculum.

These standards require a minimum compliance that evidences teaching competencies to promote the learning of their students, which are defined to serve as a reference in the promotion of training actions, improvement of teaching performance and promotion of their professional development. Figure 1 shows the evaluation of teaching performance.

Figure 1
National percentages of teacher performance by educational category



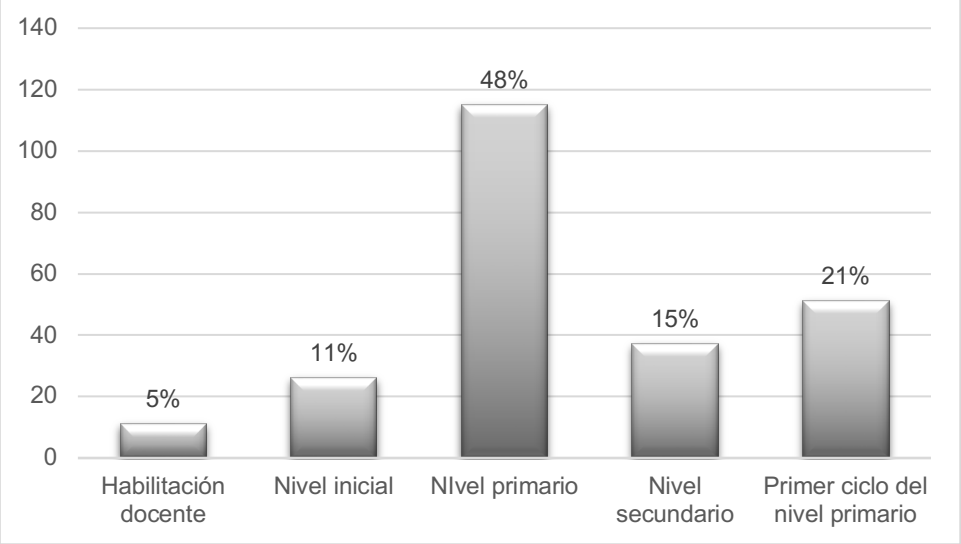
Note. Taken from Ministry of Education of the Dominican Republic. (2017, p.15).

As can be seen, 2.9% of the teachers obtained a category of outstanding, while 38.1% received the category of competent, which adds up to only 41% of the teachers with a level of professional performance that endorses a good development of teaching competencies. These data allow us to affirm that the majority of teachers in the Dominican educational system show a low professional performance, since 73.2% are between the basic and insufficient categories, from which it can be inferred that three quarters of teachers are not achieving the results expected by the educational system.

This information serves as a reference to guide educational policies in teacher training, the school curriculum and the school day, being coherent with the shortcomings of the education professional identified by Arias (2021) with respect to the teacher profile, motivations, disposition and training. The main results of the teacher performance evaluation (Minerd, 2017) contribute to the definition of a new profile through the identification of training needs and the promotion of teacher professional development.

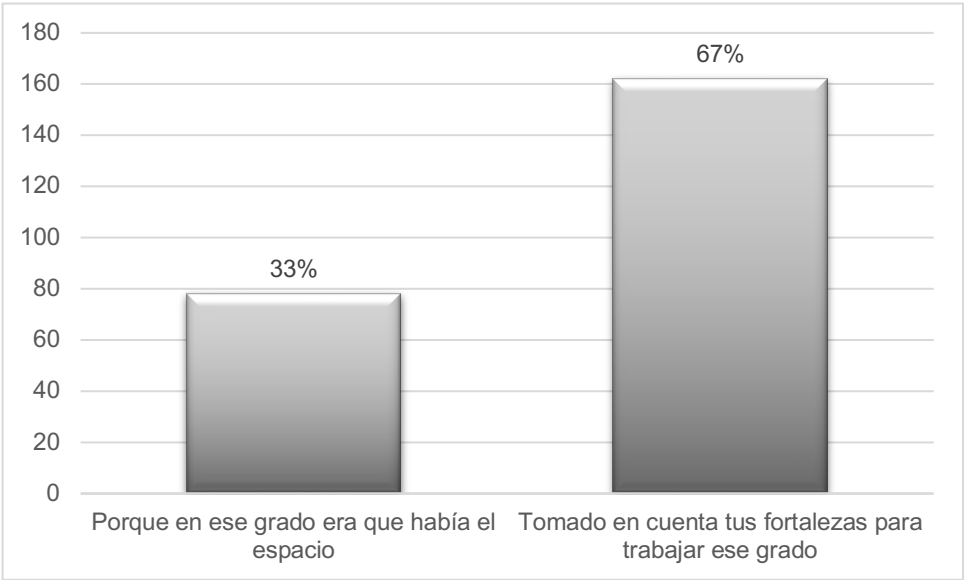
The results of the questionnaire applied to 240 Dominican primary school teachers are presented below. Figure 2 shows the data on the academic degree that evidences notable distortions between initial training and the educational level at which it is taught. Thus, 37 teachers were trained for the secondary level (15.4 %) and 26 teachers were trained for the initial level (10.8 %), while 11 teachers come from other careers and have teaching qualifications (4.6 %).

Figure 2
Area of initial teacher training at the primary school level



The main result offered by these data is that 30.8% of primary level teachers were not initially trained for the development of the curricular plans set forth by the Ministry of Education for this level, and consequently, they do not have the entry profile according to the requirements established in the statute of the teaching regulations. Specifically, only 21.3% say that they have been trained in one of the two cycles that make up the primary level, which reveals a lack of training, since teaching skills for this level are acquired during professional practice. The Figure 3 shows that 78 of the 240 teachers in the sample, upon entering the primary level, were not assigned to the grade, taking into account their competencies and that the decision was due to the fact that there was space available for them to work.

Figure 3
Reasons for being assigned to the grade in the school where he/she works

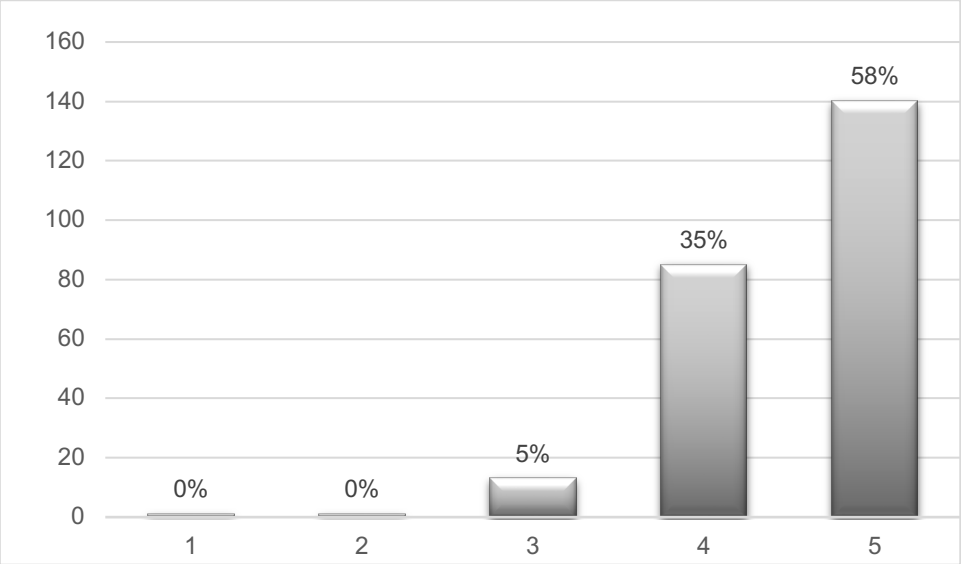


These data show that 162 teachers (67.5%) took into account their training profile when they were assigned to work at the primary level, and it is important to highlight two main findings. First, it is significant that a number of teachers work at the primary level without the proper initial training that would give them a suitable profile for the job they perform. Second, the school administration, when placing teachers, does not take into account the professional competencies that certify the adequate performance of their functions, and it is based on non-academic factors, due to coverage needs.

Regarding the professional competencies reflected in the initial teacher training process at the primary level, 100 teachers (41.7% of the total sample) responded that they did not have a high level of knowledge and understanding of the stages of physical and psychological development of their students, as shown in Figure 4.

Figure 4

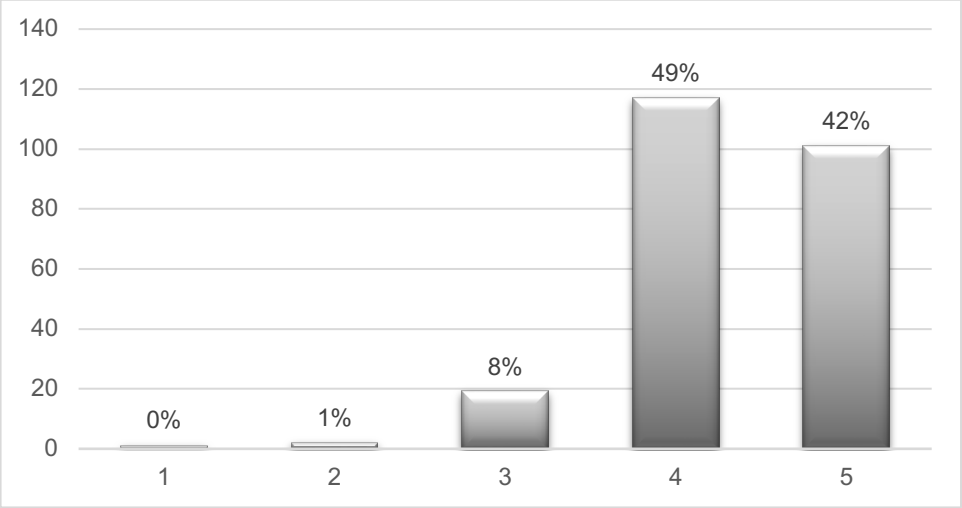
Knowledge and understanding of the developmental stages of their students



The data indicate that 140 teachers master the characteristics corresponding to the cognitive, linguistic, social, emotional and physical development of their students, which favors compliance with Minerd (2016) regulations to enhance learning, data shown in Figure 5. At this level, a complex process of construction of new knowledge begins, where thinking becomes less intuitive and advances towards more logical levels, showing significant advances in the abilities to relate cause and effect, categorize, serialize and make inferences.

Figure 5

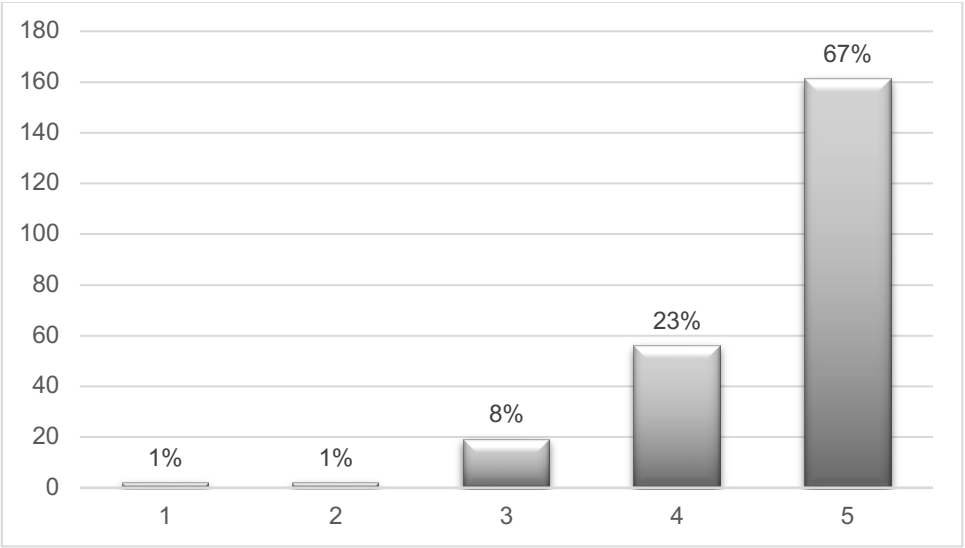
Recognition of students' learning and development patterns



As can be seen, 139 teachers, equivalent to 58%, do not fully master the particularities of their students' development, which limits their competencies. Only 101 teachers (42%) express knowledge of the basic patterns of development and learning at this stage. Regarding pedagogical competencies, Figure 6 presents the level of knowledge and understanding of the curriculum design at the primary level, showing that 79 teachers (32.9%) express not having full knowledge of the curriculum they teach; an indicator to be related to the students' limitations in learning. This scenario compromises the performance of teachers, entrenching the perception that their practices are inefficient and ineffective and increasing the discredit of the profession.

Figure 6

Knowledge and understanding of the curriculum design at the primary level



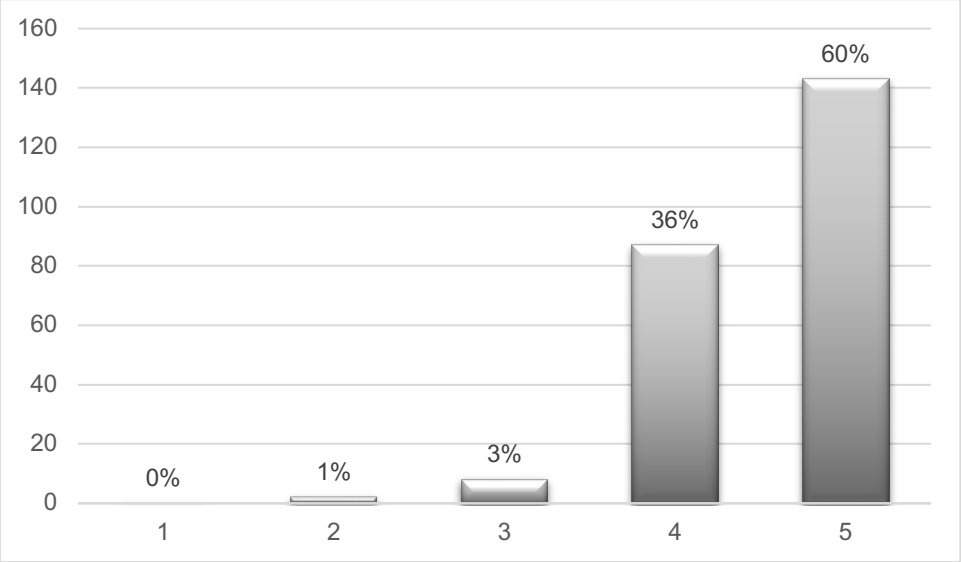
These data confirm that an important challenge is to incorporate pedagogical competencies in reading, writing, mathematics and science into the profile of teachers at this level, since, for example, only the reading curriculum contains five domains that

teachers must develop in their students: decoding, literal and inferential reading comprehension, reflection and evaluation, textual diversity and reading strategies (Unesco, 2019). Likewise, an adequate management of reading strategies is required for elementary school teachers to emphasize the reading of diverse texts that prepare students for the appreciation and aesthetic enjoyment of varied genres, which are present in culture as well as in daily life.

Figure 7 presents the frequency with which teachers identify, understand and use various techniques, instruments and types of assessment to evaluate their students' learning. It can be seen that a significant number of teachers (40.4%) consider themselves insufficiently prepared in relation to the knowledge of the learning assessment process for the development of competencies, which implies using different instruments and means according to the competency to be assessed and in contexts similar to the real life situations of the students.

Figure 7

Preparation for assessing student learning

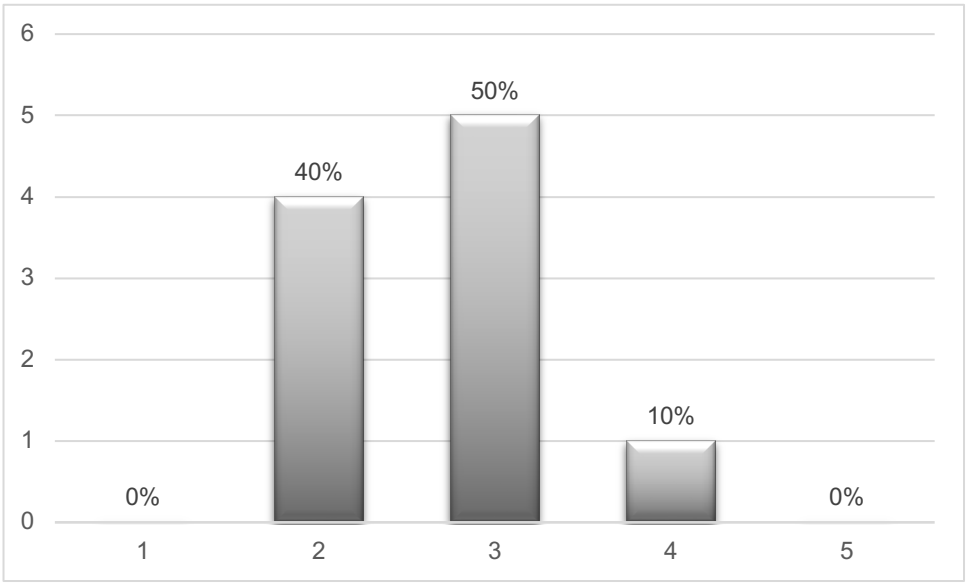


These results show that 143 teachers (59.58 %) self-assess themselves with a high level in the use of techniques, instruments and types of assessment to assess their students' learning; followed by 87 teachers (36.25 %) who claimed to use it on a less frequent scale and only 10 teachers (4.17 %) do not frequently use a variety of learning assessment strategies. The Dominican curriculum design suggests the development of eleven assessment strategies in order for the teacher to identify what the student has achieved and what he/she has yet to achieve.

The results of the instrument applied to 10 experts in Dominican primary education are presented below. In their opinion, the level of application of technological resources and means by teachers is low, since they rated 40% on the scale of two and 50% on the scale of three. Just 10% on a scale of four as shown in Figure 8. This data contrasts with the reality following the pandemic that in the 2020-2021 school year required its use to continue education in virtual conditions, which generated changes that marked a new stage for the competencies required in teachers at all educational levels and which requires adjustments in primary education.

Figure 8

Application of technological resources and media by elementary school teachers



Limited technological competence is an obstacle to the improvement of teaching performance, because as Rodriguez (2016) expresses, technology not only stimulates creativity and innovation, but also contributes to intercultural dialogue and plays an important role in overcoming individual learning problems so it is increasingly important, not only as a skill in itself, but as a facilitator of other skills such as teamwork and learning to learn, among others. The technological competencies required by teachers are changing rapidly and their incorporation is urgent in order to meet the aspiration of promoting better student learning and developing other professional competencies.

Figure 9 shows the main reason why teachers do not use technological tools in their pedagogical practices, i.e., 50% of the experts agree that these media are practically absent in their training and the other 50% state that they are used very infrequently. In the absence of the development of technological competencies in training processes, there is no guarantee that teachers will use Information and Communication Technologies (ICT) to design and manage teaching strategies, plan, choose and structure materials, use the Internet as a teaching resource, handle information in digital format, use social networks and learning platforms, among other resources to be incorporated into the teaching and learning process.

Figure 9
How often do teachers use technological means for their training?

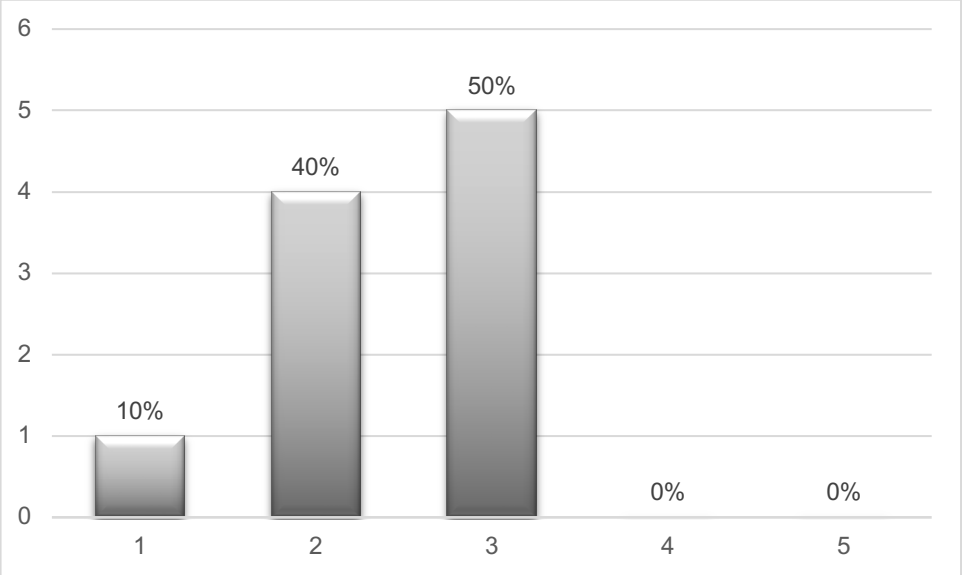


Figure 9 shows that the experts' rating on the use of technological resources for 50% is the lowest and with the intermediate scale for the other 50%. None of the experts used the highest categories of the scale (4 and 5) to evaluate this training. Currently, this deficiency has an unfavorable impact on professional competencies, since, as Tejada (2009) argues, the training possibilities of ICTs free teachers from repetitive, strictly informational tasks, so that tutoring, guidance, motivation, programming and evaluation become more important. The role of the incorporation of this competence is to increase the teacher's capabilities in the production and edition of digital content, as well as in the management of different technological platforms that increase the communication channels in the educational community and promote a research culture as an inherent part of the professional activity.

The characterization of the current state of professional teaching competencies for teachers' work with the primary education curriculum, in terms of their articulation with student learning outcomes, requires the selection, definition and description of the competencies that dimension their profile. In this sense, we agree with Martínez et al. (2016, p. 177) that "such competencies are associated with the functions and tasks of teachers, in addition to the generic-transversal relationship that contribute to the achievement of educational goals in Education".

With regard to the functions and tasks of teachers, the competence for curriculum management and implementation stands out, showing that 32.9% of the teachers expressed that they did not have full knowledge of the curriculum design they teach. This shortcoming limits them not only so that students can appropriate the elements of cultural heritage, but also so that they can become responsible, active and committed members of society and, subsequently, professionals who contribute to the development and transformation of society in general.

Competence in educational assessment is an essential component in the teaching profile, through which significant information is observed, collected and analyzed regarding the possibilities, needs and achievements of students. Teachers consider themselves insufficiently prepared to reflect, make value judgments and take pertinent and timely decisions in the use of different instruments and means in accordance with

the competence to be evaluated and in contexts similar to the real situations experienced by the students.

Regarding the professional competencies that contribute to the achievement of the educational goal, the data revealed that 41.7% of the total sample do not have a high knowledge and understanding of the developmental stages of their students. It is agreed with Campo (2009) that knowledge of these stages of children's development and learning are of utmost importance for school progress, since students who do not develop, for example, mature motor patterns in this period will have difficulties in acquiring more complex skills necessary to successfully advance to other stages of ontogenetic development.

Finally, with regard to technological competence, 40% of teachers do not apply technological resources and means in their pedagogical practice. The greatest challenge in the current circumstances is the teacher's motivation and attitude towards educational innovation with the use of ICT, which should increase as he/she increases his/her instrumental-didactic training and discovers the effectiveness of using ICT models that can be easily reproduced in his/her context and help him/her in his/her teaching work.

Discussion and conclusions

From the integration of the data from the documentary study, the questionnaire applied to the teachers and the analysis by expert criteria, two ideas are formulated that articulate the results: First, the professional competencies attained by the primary level teacher are essential to lead educational processes consistent with the guidelines of the Dominican educational system that allow them to develop a teaching and learning process adjusted to the curriculum. Second, the teachers in the study present low levels of mastery in the organization of pedagogical practice taking into account the demands of the classroom in the current scenario, whose deficiencies are manifested from the initial training and, therefore, have repercussions on the learning results at this level.

Among the factors associated with professional teaching competencies that articulate with student learning outcomes, in coherence with the components of the primary level curriculum design, are the use of argumentation as a strategy for the development of fundamental and specific competencies; analysis and synthesis for the comprehension and production of oral and written texts; the organization, planning and evaluation of varied activities; and the application of technological resources and means in pedagogical and daily practice.

The professional teaching competencies that define the profile of the teacher in the Dominican Republic are limited by the low mastery of the curriculum for this level, noting that some teachers do not use the evaluation strategies provided by the curriculum design to measure the level of competencies acquired by students. Therefore, in the Dominican context, a good teacher must have a profile that allows him/her to develop fundamental and specific competencies in a way that guarantees greater and better learning opportunities for students and that will be useful to them throughout their lives.

Technological competencies constitute the most insufficient component in the current state of professional teaching competencies, which is manifested both in the training processes and in performance, affecting the low learning outcomes of students. The use of technological resources continues to be a challenge that is becoming increasingly relevant in educational practices and leads to rethinking the ways of facing

the challenges associated with the emergence of the knowledge society, in order to offer a useful education for students in their future citizenship activities.

The creation of a profile of professional competencies of primary school teachers in their articulation with student learning has become a current demand that allows for the creation of new professional development opportunities to improve performance. The study recognizes the need to project lines of action in the area of teacher training that will make possible the formulation of criteria to guide the selection of education professionals, in accordance with the demands of educating students prepared to take advantage of their potential for their own benefit and that of society as a whole.

The lines of action that articulate teacher training should be oriented towards a deeper knowledge of the curriculum being taught in terms of student diversity, greater mastery of the assessment strategies proposed by the curriculum and their creative design depending on the specific contexts and heterogeneity of the student body and, finally, the development of technological competencies that enhance the processes of educational innovation. Complementary lines of action include the strengthening of the cultural scope and moral dimension of teaching, as well as the modes of collaboration in decision making and joint action with other teachers, and finally, strategies for inclusive education that take into account the diversity of students. The resulting advances in the development of professional competencies will promote a more effective and efficient performance of the teacher's activity.

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ANALYSIS OF THE REQUIREMENT OF SOFT SKILLS IN THE FIELD OF BUSINESS ADMINISTRATION, MARKETING, AND ADVERTISING IN THE STRENGTHENING OF ACADEMIC CURRICULA

ANÁLISIS DEL REQUERIMIENTO DE COMPETENCIAS BLANDAS EN EL CAMPO DE ADMINISTRACIÓN DE EMPRESAS, MARKETING Y PUBLICIDAD EN EL FORTALECIMIENTO DE LOS CURRÍCULOS ACADÉMICOS

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ABSTRACT

Higher Education Institutions (HEIs) have a fundamental challenge since they must develop soft skills in an integral way so that professionals in Business Administration and Marketing and Advertising can achieve professional success. The transformations in organizations demand training where the need for employees to possess skills such as critical and analytical thinking, teamwork, empathy, tolerance, time management, and the ability to transform new learning into information that serves as a basis for decision-making and provides solutions to the various situations that may arise along the way. The objective of this study has been to identify and analyze the soft skills in greatest demand that the labor market requires in both careers. The research was carried out quantitatively with statistical techniques and tools. The research design was cross-sectional since the study variables were not manipulated. The results of this research indicate that there is currently no significant difference between the level of soft skills required by companies and the level demonstrated by graduates. It is expected that, te findings obtained from this research, iill contribute positively to raising awareness among the authorities to change and evolve the role of education from the traditional way to a new role where the formation of competencies is considered in the new study plans. in an active and dynamic way, and allow graduates to perform their work effectively and successfully in organizations.

Palabras clave:

RESUMEN

Las Instituciones de Educación Superior (IES) asumen un reto fundamental al desarrollar en los diseños curriculares competencias blandas de forma integral para que el egresado en Administración de Empresas y en Marketing y Publicidad puedan

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competencias, educación, habilidades blandas, desempeño laboral	lograr el éxito profesional. Las organizaciones demandan una formación en donde se observa la necesidad que los empleados posean habilidades tales como: un pensamiento crítico y analítico, trabajo en equipo, empatía, tolerancia, capacidad para transformar los nuevos aprendizajes en información que les sirva como base para la toma de decisiones y brindar soluciones a las diversas situaciones que puedan surgir en el camino. El objetivo de este estudio ha sido identificar y analizar las habilidades blandas de mayor demanda que requiere el mercado laboral en ambas carreras. La investigación se realizó de manera cuantitativa con técnicas y herramientas estadísticas. El diseño de la investigación fue de corte transversal, ya que no se manipularon las variables de estudio. Los resultados de esta investigación indican que actualmente no existe diferencia significativa entre el nivel de competencias blandas requerido por las empresas y el nivel demostrado por los egresados. Se espera que, con los hallazgos obtenidos de esta investigación, contribuya positivamente a concientizar a las autoridades para cambiar y evolucionar el rol de la educación de la manera tradicional a un nuevo rol en donde la formación de competencias sea considerada en los nuevos planes de estudio de una manera activa y dinámica, y permitan a los egresados desempeñarse en su trabajo de una manera efectiva y exitosa en las organizaciones.

Introduction

Higher Education Institutions (HEI) present new challenges and demands to enhance and facilitate the labor market insertion of future graduates. In recent years, the need for the development of soft skills has been observed, for this reason, universities must respond to the changes that occur in society. Aguinaga & Sánchez (2020), Ruiz de Vargas, Jaraba Barrios & Romero Santiago (2005), have explained that these transformations require people prepared to generate changes, with relevant and useful knowledge for the performance of their work, and timely actions in the face of the various problems of life.

Buxarrais (2013) and Ortega (2017) express that the success of a person in the development of his or her profession depends on soft skills and hard skills and describe soft skills as a set of skills that allow performing better in work and personal relationships. They allow us to put into practice principles and values that contribute to the development of the individual in different areas of action: working under pressure, flexibility, adapting to change, self-confidence, assertive communication, critical thinking, teamwork, among others.

A study conducted by the Inter-American Development Bank (2017) on employment in Latin America, pointed out that socioemotional skills are the ones most valued by executives and precisely these are scarce in young people. In this regard, Millalén (2017) indicates that organizations are concerned about the gap they perceive between the technical knowledge and socioemotional skills of young people entering the labor field. Vargas and Carzoglio (2017) express that: "the mismatch between supply and demand for soft skills ranges from the employment of workers classified in less complex activities, to the lack of specific qualifications in certain sectors". Bitar (2020) states that in Latin America there are few institutions dedicated to collecting, researching and analyzing existing data and information to understand global trends, and that in general Latin American countries do not design the public policies necessary to advance and develop training and education programs to reduce the gap in the labor market.

Barreto & Izquierdo (2017) recommend that one should not only master the theoretical and technical knowledge inherent to "hard competencies" but also possess "soft competencies" such as: leadership, communication, teamwork, conflict resolution, initiative, etc. New professionals must possess a wide range of hard and soft competencies, as well as the ability to integrate them.

The problem faced by HEIs is the development of a curriculum that prepares professionals to develop soft skills. Gómez Gamero (2017) states that the challenge is to prepare workers to continue updating their knowledge, and for this to become the cornerstone for the development of their skills throughout their lives. Espinoza and Gallegos (2020) specify that current education has evolved over time, so it is necessary to become aware of the importance of soft skills, both in the workplace and in everyday life.

Based on the literature consulted, the importance of training professionals who develop transversal skills for their work performance has been recognized; therefore, the research was carried out to identify, describe and determine which are the soft skills most in demand in Business Administration and Marketing and Advertising graduates. The scientific problem that was elaborated to carry out the research was: *what are the most in-demand competencies in Business Administration and Marketing and Advertising careers?* The academic importance of the study consists of improving and updating the curricular designs of the Business Administration and Marketing and Advertising careers,

so that future graduates can develop soft skills to achieve professional success in their job functions.

Method

In order to carry out the research, a problem statement was prepared and a review of the literature and research related to the topic was carried out. The general objective and four specific objectives were elaborated, and the research was designed with a quantitative, cross-sectional and descriptive approach, since the criteria and characteristics of the competencies were described, as well as the profiles of the people who participated in the research.

According to Hernandez-Sampieri and Torres (2018) quantitative research answers the research questions, which allowed examining the data in a scientific way, the analysis was performed using statistical techniques and tools. An instrument was constructed for data collection, validated by experts in the field. The paradigm used in the research was socio-critical because it was related to a dynamic, evolving reality, with the objective of improving educational practices, through observation and the participation of members of society.

The main purpose of the research consisted not only in explaining and understanding the importance of soft skills in university education, but also in improving the curricular designs so that graduates in Business Administration, Marketing and Advertising can achieve professional success.

The competencies that make up the questionnaire are the result of a review of the state of the art where the following elements were taken into account: essential competencies for professional development; previous studies related to the subject; analysis of job offers; and primary requirements of the companies. The study population was composed of graduates in Business Administration and Marketing and Advertising, and the information for the study was collected independently through a survey in which thirty-three (33) companies participated. The first part of the questionnaire contains demographic information corresponding to the respondents. In the second part there were indications for evaluating the level of importance of the competencies for the companies and the level demonstrated by the graduates of both careers; nine competencies were analyzed with their respective criteria and a Likert evaluation scale was elaborated, ranging from 1 to 5, from very low to very high, as shown in Table 1.

Table 1

Response category (Likert scale)

Importance for the company					**Organization and Planning**	Level demonstrated by employees				
1	2	3	4	5		1	2	3	4	5
Very Low	Download	Media	High	Very High		Very Low	Download	Media	High	Very High
					Orders and carries out the activities of the area properly.					
					Manages and administers time efficiently.					
					He has a positive and anticipatory attitude.					
					Discern what is important from what is a priority.					
					Achieves expected results in complex activities.					

The questionnaire items were validated with Cronbach's alpha reliability test analysis with 33 valid cases and no excluded cases (Table 2).

Table 2
Summary of data processing

	N	%
Valid	33	100.00
Excluded	0	0
Total	33	100.00

Table 3 reflects that the Cronbach's coefficient was 0.961, which is representative of a high and satisfactory reliability.

Table 3
Reliability statistics

Cronbach's alpha	No. of elements
0.961	33

The results of the quantitative study were analyzed through descriptive statistics, and tables, graphs and averages were prepared to find patterns and trends for each competency studied. Data processing provided insight into the fundamental problem of the study, as well as answers to the research questions. SPSS and Excel statistical software were used to tabulate, analyze and interpret the data.

Results

Data collection made it possible to identify the most important competencies in the graduates of both careers, as well as to recognize weaknesses and aspects to be strengthened in the formation of competencies. The results of the study were tabulated as follows: To determine the importance of the company and the level demonstrated by the employees, a range of importance was given from 1 to 5, with 1 being the lowest and 5 the highest. The MB+B+M column represents the minimum value *of importance for the* company; the A+MA column represents the maximum value *of importance given* to the competition. The same description applies to the level demonstrated by employees.

The instrument was sent to 57 companies, and responses were received from 33 companies related to the areas of management, human resources, coordinators and supervisors. Sixty-four percent of the participants were female and 36% were male. According to the results obtained, 21.2% of the participants are just starting out in the labor field and 78.2% of the sample are people over 31 years of age, which indicates that they have sufficient experience to observe the soft skills of the graduates.

Research competencies

Organization and Planning are important competencies in the professional development of managers and marketers-advertisers. Table 4 reflects the minimum and maximum results awarded by the company and the level demonstrated by employees. The five criteria selected reflect a minimal difference between the result given by the company and the level demonstrated by the employees. There is a positive consistency in this competency since the graduates are above the minimum value of the level of importance given by the company.

Table 3
Organization and planning

Criteria	Code	MB+B+M	A+MA Company	A+MA Employee
Orders and carries out the activities of the area properly.	OyP1E	6.1	93.9	90.6
Manages and administers time efficiently.	OyP2E	3	97	96.9
Has a positive and anticipatory attitude	OyP3E	6.1	93.9	81.2
Discern what is important from what is a priority.	OyP4E	3	97	75.0
Achieves expected results in complex activities	OyP5E	6.1	93.9	81.2

Leadership: Núñez, Bravo, Cruz & Hinostroza (2018) express that a manager must possess a proactive attitude that influences people in a positive way. Six criteria were chosen to study this competence: Leads the development and implementation of plans

(75%); Anticipates risks and opportunities and manages problems that arise in a timely manner (96.9%); Assumes the objectives, orienting his/her actions towards achievement (75%); Detects needs for the accomplishment of tasks (93.9%); Manages people and resources with ownership and assertiveness (97%); Motivates and involves the team towards the achievement of objectives (97%). When analyzing the results, a positive regularity is observed, since the results of the level demonstrated by the graduates are above the minimum value expected by the employer.

Communication; To determine the importance of the communication competence, the following criteria were established: Clearly states information (84.8%); Uses appropriate channels for communication and shares knowledge ($90.9); Selects and organizes information in an appropriate manner (97%); Messages are concrete and relevant (78.8%); Uses confirmation mechanisms to ensure that it has been understood (93.3). Only two of the above criteria scored lower than expected by the companies. These results reflect a positive impact, since they exceed the minimum value expected by the employer.

Teamwork is the active capacity in the pursuit of a common goal by subordinating personal interests to team objectives (Chiavenato, 2018). In three of the six criteria, it is observed that the employee exceeds the employer's expectations: Works collaboratively and cooperatively (97%); Respects and is tolerant of others' ideas and shows empathy (90.9%); Asks questions to ensure understanding of the project (93.9). However, teaching-learning strategies should be considered to achieve better mastery in the following criteria: Knows how to listen and allows speaking without interrupting (75.8%); Strives to understand the other's point of view (78.8%); and Uses dialogue and negotiation to solve problems (75.8%).

Creativity and innovation allow analyzing different situations to seek the best alternative action in decision making, develop novel ideas, as well as improvements in processes, systems, structures or methods (Schnarch, 2020). Five criteria were established for the study of this competency and it is concluded that the results of the level demonstrated by the employees are consistent with the employer's results. Only one criterion scored lower: Generates ideas to respond to the demands of the environment (72.7%). This result indicates that more consideration should be given to this competency in a transversal manner in the curricula in order to strengthen it.

Learning capacity and knowledge management are competencies that strengthen the exchange of information and experience within an organization. Álvarez-Cedillo, Aguilar-Fernández, Álvarez-Sánchez & García & Patiño, (2020) state that knowledge management seeks to transfer explicit knowledge and reuse it to achieve better performance. Of the five criteria selected, two of them scored lower than expected by the companies: Being alert to new knowledge to detect opportunities for improvement and Positioning oneself critically in the face of information both scored 69.7.

Use of information and communication technologies (ICT), with the advances in technology, professionals must perform their work using ICT, so these become an ideal complement that promotes the development of autonomous learning. Table 5 shows that employees exceeded employers' expectations.

Table 4

Use of information and communication technologies

Criteria	Code	MB+B+M	A+MA Company	A+MA Employee
Master basic aspects of computer use.	TIC1E	3	97	97
Master and use different software for information management.	TIC2E	6.1	93.9	97
Manages and uses digital tools to communicate.	TIC3E	9.1	90.9	97
Manages information through ICT.	TIC4E	3	97	93.9

Foreign language proficiency was divided into four criteria: Reads and understands information in another language (84.8%); Understands texts in another language (84.8%); Writes and expresses him/herself orally in another language (78.8%); and Communicates and interacts with others in another language (81.8%). The level demonstrated by the graduates was lower compared to the score given by the companies.

Decision making is a process by which managers respond to the opportunities and threats presented to them, analyzing options and making decisions related to organizational goals (Ramirez, 2022; Hill et al, 2009). Six criteria were taken into account for this competition: Analyzes variables to identify consequences; Evaluates different alternatives before making a decision; Is assertive in justifying the decision made: Uses past experience to make future decisions; Takes into account the integral need of the team; Uses knowledge of its environment to make decisions. All criteria received a score of 97, exceeding the range of scores (87.9 - 90.9) given by the companies.

Ethical and social commitment is an attitude and skill that implies solidarity with the needs and objectives of others. Five criteria were selected for the study of this competency: Demonstrates ethical and professional commitment (90.9%); Values and respects diversity (78.8%); Demonstrates commitment to environmental conservation (97%); Demonstrates social and civic responsibility (81.8%); Acts with justice and human equity before organizational conflicts (84.8%). The only criterion that is above and beyond the expectations of companies is judgment: Demonstrates commitment to environmental conservation.

Emotional control is the ability to handle emotions in an appropriate way, by assimilating them in thought they help us to understand and reason our own and other people's emotions. Of the six criteria chosen, in four of them the scores obtained were equal to or higher than the companies' expectations: Manages stress (97%); Detects the symptoms of stress and takes measures to manage them (90.9%); Focuses emotions towards the positive (97%); and Tolerates frustration and adversity (93.9%); In general, the levels demonstrated by the graduates are above the minimum value of the level of importance for the company, which shows a positive regularity in the Emotional Control competency.

The *entrepreneurial attitude* is essential for professional and social development, as it drives the economic development of society. An entrepreneur can identify opportunities and organize the necessary resources to achieve his or her objectives. Six criteria were chosen to study this competence: Detects new opportunities (81.8%); Has initiative and self-confidence (97%); Is committed to identity and professional development (78.8%); Locates the resources available and necessary to execute a project (78.8%); Seeks continuous improvement (97%); Takes on new challenges with optimism (97%); The results show that in four of the six criteria the level demonstrated by

employees is above the score given by the company (78.9-87.9), which indicates that employees are exceeding the employer's expectations.

Flexibility / Adaptability. Modern work environments require employees and organizations to react quickly to change, so education has considerable interest in developing a curriculum that addresses this competency where personality traits can be assessed (Lang et al., 2021). Six criteria were selected for this competition: Tolerates change and uncertainty (93.9%); Applies new knowledge to daily work practice (72.7%); Adapts easily to change (72.7%); Learns new ways of working (97%); and Is available to take on new tasks or activities (84.8%); Three of them scored above expectations and the other three did not exceed company expectations.

Motivation is related to human behavior and is based on the behavior, actions and needs that generate the energy necessary to motivate the individual to achieve his or her goal. (Chiavenato, 2018). Six criteria were chosen for the study of this competency: Motivated for individual development or achievement (84.8%); Maintains a positive attitude towards work (84.8%); Generates a positive effect on the organization (75.8%); Demonstrates a commitment to perform activities with quality and precision (84.8%); and Is proactive and diligent(81.8%) These results show that curricular designs should focus a little more on the motivation of students to develop this competency in a transversal manner in the curricula.

Hernández-Sampieri and Torres (2018) state that *research* involves acquiring knowledge and skills, solving problems, innovating, improving processes, designing solutions and even evaluating whether something has been done correctly. The criteria for evaluating this competency were as follows: Detects needs and delimits problems (93.9%); Designs and manages data collection techniques (87.9%); Examines and interprets information (97. %); and Prepares a research report (93.9%); Of the four criteria chosen three of them exceeded the employer's expectations.

Medina and Caro, (2021) indicate that *customer orientation* is a characteristic of the employees of organizations, and is also a factor of excellence, since it reflects a positive attitude when satisfying customer demand. Six criteria were used to measure this competency; Responds promptly to clients' demands (78.8%); Resolves complaints and suggestions (97%); Orients its work to satisfy clients' needs (87.9%); Identifies clients' needs and expectations (81.87%); Pays attention to clients and their needs (97%); Establishes and maintains relationships of respect and trust with clients (97%). It should be noted that this competency exceeds the employer's expectations, since in general of the six criteria established, three of them exceed the maximum expectations of the level of importance for the company, only two of them are below the score given by the companies.

Self-criticism plays a fundamental role in the workplace, as it is a skill that is constantly under construction, and a variant of critical thinking. Employees must possess an analytical capacity as a process of self-knowledge and a positive attitude to generate a reflection-action (Rodríguez Gómez P., & Rodríguez Gómez, J., 2022). Six criteria were selected to analyze this competence: Recognizes its limitations: Accepts responsibility for failures and apologizes for them; Accepts feedback with an open attitude and a desire to improve; Accepts the opinion of others with a positive attitude; Adopts a constructive attitude towards mistakes; The results obtained from the level achieved by the employees exceed the expectations of the companies, achieving 97% in all the criteria.

Chiavenato (2018) defines *negotiation skills* as the process of making joint decisions when the parties involved have differences. The following criteria were considered: Prepares in advance on the subject to negotiate (72.7%); Researches the most relevant points to negotiate (69.7%); Is cordial and communicative during the negotiation

(78.8%); Listens attentively and respectfully to the other negotiator (81.8%); Explains his or her point of view in a cordial and assertive manner (97%); Of the criteria established, only one exceeded the employer's expectations.

The *organization's capacity for vision* enables it to define the path to be followed in order to achieve organizational goals. Chiavenato (2018) indicates that it is a future state of where the organization is desired to arrive. To determine the importance of this competency, five criteria were chosen: Identifies the contribution each area makes to the organizational value chain (90.9%); Can describe the functions of other areas and/or departments (97%); Recognizes that its decisions may affect other areas (72.7%); Distinguishes the processes that affect other areas and/or departments (97%); Respects the functions assigned to other areas (75.8%). The level demonstrated by the graduates exceeds the employer's expectations in three of the criteria, the remaining two criteria exceed the minimum score awarded by the companies. Therefore, it can be concluded that this competency has a positive impact on the professional development of graduates.

Global Profile

Table 6 represents the global profile of the competencies selected according to the level demonstrated by the graduates of the Business Administration and Marketing and Advertising degrees. In the first column are the numbers of each competency; the second column describes the competency; the third column represents the acronyms of the competencies; the fourth column indicates the minimum value given by the companies to the competencies; the fifth column represents the positive results, where from that number the graduate is performing in an optimal way; the sixth column represents the real valuation of what was demonstrated by the graduates: The last column represents the actual assessment of the competency, i.e., if this result is achieved, the graduate would be performing the competency at one hundred percent.

Table 5
Global Profile of the Level demonstrated by employees

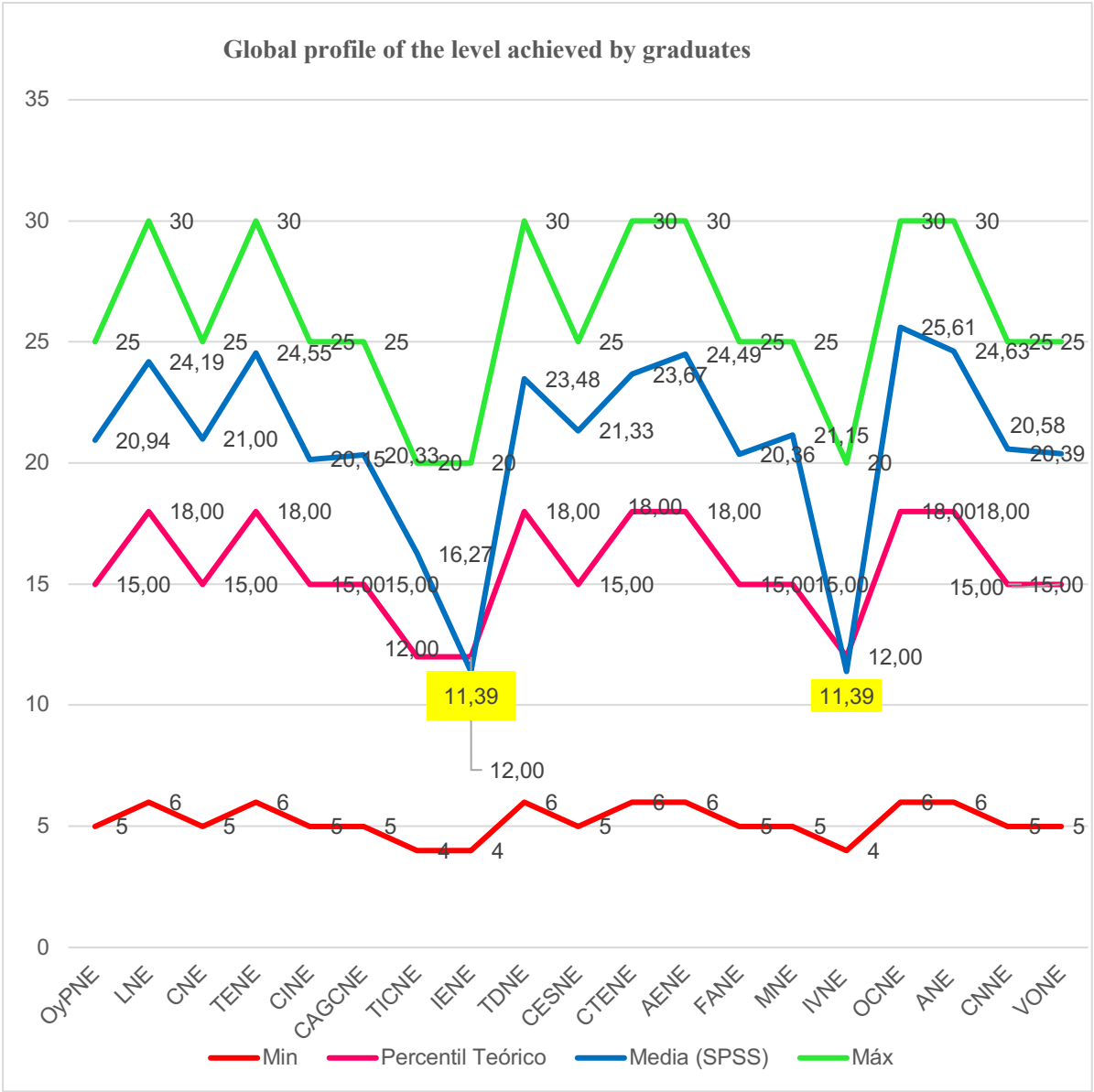
No.	Competition	Abbreviated competition	Min.	Theoretical Percentile	Mean (SPSS)	Maximum
1	Organization and Planning	OyPNE	5	15.00	20.94	25
2	Leadership	LNE	6	18.00	24.19	30
3	Communication	CNE	5	15.00	21.00	25
4	Teamwork	TENE	6	18.00	24.55	30
5	Creativity and Innovation	CINEMA	5	15.00	20.15	25
6	Learning and Knowledge Management	CAGCNE	5	15.00	20.33	25
7	Information and Communication Technology	TICNE	4	12.00	16.27	20
8	Foreign Language	IENE	4	12.00	11.39	20
9	Decision Making	TDNE	6	18.00	23.48	30
10	Ethical and social commitment	CESNE	5	15.00	21.33	25
11	Emotional Control	CTENE	6	18.00	23.67	30
12	Entrepreneurial Attitude	AENE	6	18.00	24.49	30
13	Flexibility / Adaptability	FANE	5	15.00	20.36	25
14	Motivation	MNE	5	15.00	21.15	25
15	Research	IVNE	4	12.00	11.39	20
16	Customer orientation	OCNE	6	18.00	25.61	30
17	Self-criticism	ANE	6	18.00	24.63	30
18	Negotiation Skills	CNNE	5	15.00	20.58	25
19	Vision of the Organization	VONE	5	15.00	20.39	25

Figure 1 shows the global profile of the competencies of the level demonstrated by the graduates, where the red line represents the minimum score awarded by the companies, i.e., it is considered the worst scenario that the competency can obtain. The magenta line signifies the borderline of the score for the competency, i.e., if the score obtained is less than the number in that column, the graduate has not fully developed that particular competency. The blue line is the actual performance of graduates, and the green line represents the ideal scenario for a given competency. Likewise, Table 6 shows that there are two competencies that are below the minimum border; Foreign language and

Research, both with 11.39. These results indicate that HEIs should pay attention to these competencies and improve the lines of action in their curricular designs in order to position them above the frontier. Figure 2 shows in a yellow box the minimum points that represent the competencies in Foreign Language and Research. While it is true that these two competencies are below the minimum point of the expected border, a positive impact is observed for the rest of the competencies, since the other competencies are above the border (magenta line) and above the minimum score of the level expected by the graduates (red line).

Figure 1

Overall profile of the level demonstrated by employees



Discussion and Conclusions

The modern society requires a higher education that must integrate soft skills in the curricular designs in a transversal manner for a better job performance of the

graduates. This research focused on describing and analyzing the soft skills that contribute to the performance of workers, in order to make the necessary changes in the curricular designs of the Business Administration and Marketing and Advertising careers. The data collected in the research showed that the results of the level achieved by the graduates are above the minimum value expected by the employer and mostly exceed the desired expectations. This information indicates that the competencies set forth in the curricula have been effectively developed during the years of student life in both careers. When analyzing the specific criteria by competencies, certain areas of opportunity were observed, which must be improved so that the graduate can perform successfully in his or her career. The conclusions of each of the competencies studied are presented below, to be taken into account in future curricular designs.

1. *Organization and Planning*. The competition was divided into five criteria, two of which scored lower than expected by the employer: Possess a positive and anticipatory attitude and Discern what is important from what is a priority. To achieve a positive attitude in Business Administration, Marketing and Advertising students, workshops should be developed where the student reflects on the importance and benefit of having a positive attitude. These workshops can be taught as an extracurricular activity linked to subjects in the curriculum. In addition, in order for the student to be able to discern what is important in the priorities, it is suggested that students in the core and professionalizing subjects know and develop prioritization matrices so that they can be effective in the fulfillment of activities.
2. *Leadership*. According to the global profile, there is a positive impact on the level achieved by the graduates in this competency, which indicates that this competency is being worked effectively in the curricular designs.
3. *Communication.* This competence is gaining importance in companies. The results of the global profile indicate a positive regularity in the development of this competence. However, two criteria did not achieve the expected average. To overcome this gap, workshops should be held for the graduate to develop confidence and security in presenting his or her ideas in a clear and concise manner to the audience.
4. *Teamwork.* The overall profile of this competency indicates that the level demonstrated by the graduates has a positive impact on the development of this competency. However, three of the selected criteria scored below the level of importance given by the companies. In order to improve these criteria, it is recommended that graduates receive training to help them improve their listening skills, understand the other person's point of view and use dialogue to solve problems.
5. *Creativity and innovation.* This soft skill allows the company to adapt to changes in the organizational environment; in four of the selected criteria, graduates exceeded employer expectations.
6. *Capacity for learning and knowledge management.* Graduates exceeded company expectations in four of the selected criteria. It is recommended that in order to improve the criteria: being alert to new knowledge and appropriating information, business simulators and case studies should be used to identify risks and offer various action plans for organizational improvement.
7. *Use of Information and Communication Technologies.* In the use of ICTs, the graduates demonstrated a superior level, exceeding the expectations of the companies that participated in the study.

8. *Foreign language.* The graduates did not demonstrate the level expected by employers, although they did surpass the minimum borderline score given by the companies. It is recommended that curricula be revised to include strategies that motivate students to learn a second language, such as: conversation clubs, international fairs to exhibit in another language, essays written in English, awareness campaigns.
9. *Decision making.* The results observed in this competency exceeded the expectations of the employers, so it is considered that the graduates in both careers have an excellent command of this competency.
10. *Ethical and social commitment.* The results obtained in the global profile of the competency indicate a positive regularity in terms of what is expected by the companies and the level achieved by the graduates. To ensure greater mastery of this competency, it is recommended to conduct social responsibility activities in order to encourage good practices or actions to awaken interest in ethical and social commitment.
11. *Emotional control.* The graduates exceeded four of the criteria for employer perspectives, which is demonstrated in the results of the overall profile of this competency. In two of the criteria where they did not achieve the expected average, but did achieve the minimum rating, it is suggested that seminars on emotional control, relaxation spaces, and sports activities for the development of human relations be promoted.
12. *Entrepreneurial attitude:* In order to observe this competency, six criteria were selected; in two of the criteria a lower score than expected was obtained, even so, the overall profile shows a positive incidence in the development of this competency by graduates in both careers.
13. *Flexibility / Adaptability.* There is a minimal difference in two of the criteria selected for this skill, so it is suggested to include in the curricular plans the use of business simulators to apply acquired knowledge and experience corporate situations where students can provide pertinent solutions to organizational situations they are presented with.
14. *Motivation.* In this competency, the results expected by the company and the level demonstrated by the graduates are almost similar, which indicates that this competency is being worked on effectively in the curricular designs.
15. *Research.* Four criteria were selected to study this skill in graduates, three of them exceeded the employer's expectations, the criterion where the score was lower than expected was the design and management of data collection techniques, so it is recommended to include practices in the management of statistical software for data collection such as SPSS, AcaStat, MaXStat, Minitab, Stata.
16. *Customer orientation.* The overall profile indicates a positive consistency in the results of this competency: It is suggested that in order to improve the resolution of customer demands and identify customer needs and expectations, teaching-learning strategies such as: Role-plays, plenary sessions and seminars on customer service techniques.
17. *Self-criticism.* The results obtained in this skill showed that the graduates exceeded the expectations of employers in all aspects.
18. *Negotiation skills.* Graduates obtained a lower score than expected by the company, so consideration should be given to revising the curricula to include this competency in a cross-cutting manner, as well as including the use of business simulators, case studies, role-playing and negotiation seminars.

19. *Vision of the organization.* The overall profile indicates a positive regularity in this competency, although the score in the criterion of identifying the contribution of each area and respecting the functions assigned to another area should be improved. To overcome this weakness, it is suggested to teach the student the technique to go "out of the box" to think in an innovative way, encourage brainstorming, use of strategic process maps to define where the organization wants to be in the future.

Regarding the research questions, it was determined that the most in-demand competencies required by employers in Business Administration and Marketing and Advertising careers are: Leadership, Customer orientation, Communication, Organization and planning, Teamwork, Negotiation skills, Negotiation skills

The second research question refers to the soft competencies that should be strengthened to increase the possibilities of professional success in the graduates of both careers, among them we have: Research, Foreign language.

Next, the third research question refers to the strengths, weaknesses, opportunities and threats in soft skills. The strongest competencies demonstrated by the graduates were: Creativity and innovation, Use of information and communication technologies, Decision-making, Self-criticism. The competencies with the greatest weaknesses: Foreign language and research. The opportunity that graduates have by improving the competencies in which they showed the greatest weaknesses is that by overcoming them they will have better success in their work performance, and the threat would be that by not developing the competencies in which they have less mastery, it will be difficult for them to achieve work success and therefore their opportunities for improvement will be reduced.

Every research study has limitations consisting of aspects that were not studied for various reasons. The limitations found in the study were:

1. *The sample size* only took into account companies in the department of Managua and not in the country as a whole, so the conclusions only apply to HEIs in Managua.
2. *Reliable answers with objectivity in the questionnaire*, the answers obtained are based on the perception of the people related to the human resources area.
3. *Lack of previous research studies*, the topic of soft skills in Nicaragua is a relatively new topic, as well as their transversality in the curricula; however, this weakness gives us the opportunity to identify new fields of research.
4. *The time factor* is a limiting factor in the research, since requesting companies to participate in the study requires time to complete the survey. Unfortunately, valuable information was lost from companies that had expressed interest in completing the survey and did not do so due to lack of time.
5. *Qualitative research,* the study was carried out in a quantitative manner, when interpreting the results of the data the researchers realized that through open-ended questions important information could have been collected for the study.

According to Vásquez (2022), job performance competencies influence employability, as well as professional academic training to achieve successful professional development. Likewise, they constitute knowledge and skills that the graduate can apply to carry out activities that are transferable to the labor market. (Almerich, Díaz, Cebrián, Suárez, 2018). The training of a professional is the result of planning that is in the hands of HEIs, experts in curriculum design and teachers. It is an institutional process and is the result of a research process in which the different actors participate and draw a coherent and systemic route in the profile of each career, contents,

competencies, teaching-learning strategies and the necessary evaluation for knowledge management.

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RELATIONSHIP BETWEEN STUDENT INVOLVEMENT AND ACADEMIC PERFORMANCE IN THE INTRODUCTORY PROGRAMMING COURSE FOR ENGINEERING

RELACIÓN ENTRE INVOLUCRAMIENTO DEL ESTUDIANTE Y RENDIMIENTO ACADÉMICO EN EL CURSO INTRODUCTORIO DE PROGRAMACIÓN PARA INGENIERÍA

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ABSTRACT

One of the objectives for economic growth in Nuevo Leon State in Mexico is the development of Industry 4.0 which demands for programming competencies and for the annual rate of degrees in Engineering to increase. Contrastingly, the pass rates in introductory programming course have been lower when comparing them with the rest of engineering subjects at a private university located in the Northeast of Mexico, being this condition a reason for analyzing about the situation based on the Theory of Engagement. The objective of this study was to investigate engagement of the first year engineer student in introductory programming and its relation with academic performance. A correlational study was made on a sample of 123 participants; Blackboard analytics were examined and selected and a correlational analysis was made between Blackboard analytics and academic performance using the final grades by calculating Spearman´s rho coefficient. A moderated relation positive and significative was found between student activity in Blackboard platform and academic performance (rho(116) =.448, p<.001 with statistical power .970) as well as between time invested in Blackboard platform and academic performance (rho(116) =.447, p<.01 with statistical power .995). Because of the relation found, it seems important to frequently monitor the student activity in the platform in order to foster engagement from the early stages of the academic period in introductory programming.

Palabras clave:
analíticas, involucramiento, rendimiento académico, programación introductoria

RESUMEN

Uno de los objetivos de crecimiento económico del Estado de Nuevo León es lograr el desarrollo de Industria 4.0 que requiere el desarrollo de competencias en programación y la graduación anual de más ingenieros. Por otra parte, los porcentajes de aprobación en la materia introductoria de programación han sido menores que en

	el resto de las materias de ingeniería en una universidad privada del Noreste de México por lo que se ha investigado esta situación con base en teoría del involucramiento del estudiante. El propósito de este estudio fue analizar el involucramiento de estudiantes de primer año de Ingeniería en la materia de programación y su relación con el rendimiento académico. Se diseñó un estudio relacional realizado sobre una muestra de 123 estudiantes de primer semestre, se examinaron y seleccionaron las analíticas que provee el sistema Blackboard y se aplicó un estudio correlacional entre analíticas de Blackboard y el rendimiento académico medido por la calificación final del estudiante mediante el cálculo de coeficiente de Spearman. Se encontró una relación moderada significativa y positiva tanto entre la actividad del estudiante en la plataforma y el rendimiento académico (rho(116) =.448, p<.001 con potencia estadística de .970), como entre el tiempo invertido en la plataforma y el rendimiento académico (rho(116) =.447, p<.01 con potencia estadística de .995). Debido a la relación encontrada, es importante el monitoreo frecuente de la actividad del alumno en la plataforma para fomentar el involucramiento desde etapas tempranas del período académico en la materia introductoria de programación.

Introduction

In Mexico, in the State of Nuevo Leon (2017), there is a great demand for Engineers to lead the digital transformation towards Industry 4.0 which has a strong pillar in Computational Technologies based in turn on programming (PwC, 2020); on the other hand, according to a World Bank report, only 50% of students who start an Engineering program graduate (Ferreyra et al., 2017). One of the main causes of attrition in Engineering programs is failure (Sithole et al., 2017) which can be mitigated by achieving student engagement as will be presented in this study.

In Nuevo Leon, according to the statistical yearbook of the National Association of Universities and Institutions of Higher Education (ANUIES, 2022) for the 2021-2022 school year, there are 73,286 Engineering and Technology students and 10,155 graduate annually. This figure, could be double if all entering students, graduate, considering the World Bank report, (Ferreyra et al., 2017). Nuevo León's strategic plan (2022) for the year 2030 related to economic indicators, contains the objective "3.3 Promote the generation of human capital with a focus on innovation, science and technology" (p. 120), whose indicator is the number of postgraduate graduates per 100,000 inhabitants, which in 2020 was 106 and is expected in a conservative target to be 162 (and with an optimistic target of 262) for the year 2030; it speaks particularly of specialized consulting in Industry 4.0.

The need to have more professionals to take charge of the transformation towards Industry 4.0 has caused a reflection on the pass rates of the introductory subject to programming for Engineers, where the pass rate is lower when compared to other subjects in the area in a private university in the Northeast of Mexico; it is necessary to design strategies based on a diagnosis of the situation. The objective of the study was to investigate the relationship between student engagement and learning outcomes as measured by student academic performance, using learning analytics from the Backboard learning management system (LMS) and based on Engagement Theory.

Burch et al. (2015) find that student engagement in academic courses is among the best predictors of student learning and development.

Engagement is related to retention and student grades. Tinto (2016) identifies three factors that influence motivation to persist: learner self-efficacy, sense of belonging, and perceived value of the curriculum. On the other hand, Yamauchi et al. (2016) argue that engagement is related to student persistence, retention, and grades.

"Regardless of its definition, student engagement is generally positively associated with desirable learning outcomes, both academic, social, and emotional" (Christenson et al., 2012, p. v).

In the systematic literature review conducted by Hernández Barrios and Camargo Uribe (2017) on self-regulated learning (which studies student self-efficacy) in Ibero-America, they found that 42% of the studies have been done in Spain and Portugal and only publications from five of the 19 Countries that make up Latin America were found. Only 11% of these studies analyzed the relationship with academic performance, a situation that constituted another reason to consider their study relevant.

This paper is organized as follows: first the literature review on student engagement research is shown, then academic performance is analyzed, followed by studies on learning management systems. The study hypothesis and the methodology used to test the research model are presented below. It concludes with a discussion of the results found and future work that can be done.

Higher Education Student Involvement

Higher education student engagement has been the subject of study for the last 50 years and is also a research trend as shown by Franklin et al. (2021).

Tight (2020) invites contributions on the topic of student engagement due to its growing importance caused by the flourishing knowledge-based economy. Barbera et al. (2020) explain that, after decades of effort, indicators of student retention and graduation can be identified, one of them being social or academic involvement in the first year of undergraduate studies as a predictor of success, as it is directly connected to persistence to graduation.

Fredricks et al. (2016) explain that engagement has been increasingly studied in the past 20 years for its potential to work with persistent problems in Education, such as student academic performance, attrition, as well as student boredom and isolation. The increase in its popularity is due to the fact that:

It has shown its relationship with academic achievement, lower dropout rate, lower delinquency and depression rate, because it is observable, because all teachers understand it, and because most teachers present disengagement as the biggest challenge they encounter, (p. 2).

"Engagement is attractive because it is malleable to changes a teacher makes in his or her instructional practices" (Fredricks et al., 2016, p. 3).

Tight (2020) states that the more involved a student is with his or her higher education and the institution that offers it, the less likely he or she is to voluntarily drop out without completing his or her studies. Zepke (2018) suggests that learner engagement can serve as an antidote toward learning outcomes that are problematic. Mandernach (2015) reviews the literature for assessing student engagement and the tools that have been used to measure it and indicates that engagement not only includes time spent on a task (behavioral component) but also emphasizes an investment of attention and intellectual vigor, so that engagement has cognitive and affective components.

According to Astin (1984), Fredricks et al. (2004) and Trowler (2010) there is evidence that a high level of student engagement is associated with desirable positive outcomes including increased learning, lower attrition, increased personal development and success, satisfaction, persistence, academic achievement, and social engagement.

Kahu and Nelson (2018), suggest that a known pathway to student success is engagement.

Mandernach (2015) provides the following definitions of involvement, citing their authors; they are presented below in chronological order:

- Astin (1984) defines involvement as "the amount of energy (physical and psychological) that a student devotes to his or her academic experience" (p. 298).
- Natriello (1984) states that involvement includes "participating in the activities offered as part of the academic program" (p. 14).
- Skinner and Belmont (1993) define engagement as a "behavior of sustained intervention in learning activities accompanied by a positive emotional tone" (p. 572).
- Kuh (2003) explains that there is a reciprocal responsibility in fostering engagement, his definition being "the time and energy the student devotes to meaningful activities both inside and outside the classroom, as well as the policies and practices the institution uses to induce the student to take part in these activities" (p. 25).
- Barkley (2010) argues that learner engagement "...does not mean they are being entertained, it means they are thinking" (p. xii).

Christenson et al. (2008) define student engagement as the set of commitments that students make to learn and participate in the educational environment in order to achieve the desired results.

Skinner et al. (2009) define involvement as "the quality of student participation in academic activities, values, and goals" (p. 494).

Kanaparan et al. (2017) set out the following definitions of involvement, citing their authors:

- Fredricks et al. (2004) define academic engagement as the set of psychological and behavioral attempts a student makes to learn, i.e., to master the skills and knowledge of academic activities. Students with high academic involvement will feel that they are accepted and appreciated in their learning activities and this will trigger serious attempts to achieve high academic performance. School engagement is the student's involvement in both academic and non-academic activities that can be observed through their behavior, emotions and cognitive aspects both in the classroom and in school in general.
- Christenson et al. (2012) state that engagement is a multidimensional construct and is defined as "students' active participation in academic and co-curricular or school-related activities and their commitment to educational and learning goals" (p. 4).
- Christenson et al. (2012) add that "learner engagement leads to learning, requires energy and effort, is affected by multiple contextual influences, and can be achieved by all people who want to learn" (p. 4).

Henrie et al. (2015) suggest that academic engagement "is the commitment or attempt a student makes to intervene in the context of academic learning in school" (p. 37).

Tight (2020) also explores definitions of engagement and cites Zepke (2018) who states that learner engagement "is a complex construct used to identify what the learner does, thinks, and feels when learning and how teachers can enhance what is done, thought, and felt in the instructional environment" (p. 695), and invites critique.

Although there are differences in definitions, there is general agreement among authors that there are three dimensions of student engagement: behavioral (behavioral), cognitive and emotional (also called motivational or affective).

The above definitions speak of three interrelated factors: (1) cognitive: the amount of mental effort in the tasks encountered expressed in actions such as thinking, learning, reflecting, enjoying learning and using study strategies; (2) behavioral: the amount of active responses to the tasks presented, manifested in actions such as engaging, investing energy and time, intervening, socializing, interacting and participating in a sustained way; and (3) affective: the level of investment in the learning tasks considering their emotional reactions to these tasks, manifested in their motivation, feelings, gratitude and emotions.

A learning management system stores indicators about the student's active responses during a course, for example, measuring the number of clicks of a student and the time spent on the platform, among others; these behavioral indicators have been considered for the present study and are available at the University.

Due to the relevance of student engagement as discussed above, we have analyzed the relationship between student engagement measured through indicators of the Blackboard platform and their academic performance.

Academic performance

Higher education is a key factor for the development of individuals and countries. Individuals with higher degrees of higher education are more likely to find employment,

perform better on various tests, and have better health than their contemporaries (Schneider & Preckel, 2017).

According to a report by the Organization for Economic Cooperation and Development (OECD, 2017), students who complete a Higher Education degree are more likely to be employed and earn higher salaries and are less likely to suffer from depression when compared to their peers who did not complete a Higher Education degree.

In Tinto's (1975) and Bean and Metzner's (1985) models for traditional and nontraditional students, academic achievement is a predictor of persistence. Li and Carroll (2017) showed that being at risk of dropping out is associated with having lower grades than the institutional mean.

The study of academic performance has been a topic of research interest and continues to be studied as an indicator of academic quality. Sakiz et al. (2021) state that academic performance is a reliable measure of the level of knowledge and skills acquired in higher education.

Kumar et al. (2021) have developed a study of definitions of academic achievement over time and have found that they are varied and range "from the achievement of an academic grade to the development of the student in a moral sense," from "passing courses and having knowledge and skills, to developing skills that allow for career advancement" (p. 3091). In general, it is "to ensure and instill a significant change that will occur at the psychological, affective, cognitive and behavioral levels in the learner, which is the ultimate goal of the educational system in the World" (p. 3091).

Academic performance, add Kumar et al. (2021), can be defined as:

The knowledge that is achieved by the student and that is evaluated through grades assigned by the teacher and/or by educational goals established by students and teachers that must be reached in a specific period of time, (p. 3092).

Academic achievement can be understood "as the core around which important components of the educational system revolve and this is why it is a source of attention for researchers, parents, governors and statesmen" (Kumar et al., 2021, p. 3092).

Based on these studies, it was decided to analyze the relationship between student involvement and their final grade in the introductory programming course.

Learning management system

A learning management system (LMS) is a set of digital tools and features designed to facilitate learning and coursework as presented by Dahlstrom and Bichsel (2014) who also claim that its use as a complementary part of a traditional course has been well accepted because it provides many opportunities for learning engagement for both teachers and students.

Curtis (2016) explores methods for measuring engagement in technology-mediated learning experiences and defines it as an agreed-upon, focused, and energetic engagement of the student with their learning. The measures employed should be scalable, cost-effective and minimally disruptive.

Venugopal and Rajashree (2015) studied online engagement in terms of student learning, participation, and academic performance in a blended environment using an LMS. They found that there is a positive correlation between involvement and use.

Lu et al. (2017) assert that when developing learning environments to teach programming, learning and engagement outcomes can be improved by applying Learning Analytics (LA). In their study, they provided the professor with a monthly report on at-risk students using OA in a MOOC (Massive Online Open Course) in programming at a university in Taiwan. The results showed that its use improved learning outcomes and student engagement.

Tempelaar et al. (2020) state that the measurement of learning engagement is a research topic in both Education and Learning Analytics and mention a range of instruments used, such as self-report questionnaires, data logging of technology-based learning systems, think-aloud strategies, and testing. The authors combined a self-report questionnaire with digital tracking during some assessments in a university statistics course and found patterns of engagement that can help design effective interventions.

Gardner et al. (2020) wondered which OA is most suitable in Higher Education and focused on the design of a module in a Computer Science course at the Open University of London that is designed with a CALT (computer aided learning and teaching) environment to find the relationship between the environment and student performance. Their conclusion is that these data are very useful for understanding student engagement behavior in an online environment and that the results were useful for retrospective analysis.

Atwell et al. (2021), found a strong relationship between the delivery of homework and student activities and their academic performance, so they consider that their absence is a high-risk factor in the approval of a subject. Timely submission of assignments and activities is related to student engagement.

Ahmadi et al. (2023) conducted a systematic literature review to detect the main indicators of engagement provided by an LMS; they claim that monitoring and promoting student engagement is a determining factor for its success and that the student activity data provided by an LMS can be used to measure engagement.

Based on the above, it was decided to study the relationship between student engagement measured through Blackboard analytics and academic performance measured by the student's final grade in the introductory programming course.

Research question

Is there a relationship between student engagement as measured by Blackboard analytics in the introductory engineering programming subject and their academic performance as measured by final grade?

Research hypothesis

H0: Student engagement (as measured through Blackboard analytics) is not related to student learning outcomes, being an outcome their final grade.

H1. Student engagement (measured through Blackboard analytics) is related to student learning outcomes, one outcome being their final grade.

Method

To measure the association between two variables (Hair et al., 2020), correlation analysis is used, which is a statistical methodology that attempts to establish the relationship between two or more variables by calculating the correlation coefficient between them. The coefficient varies between -1 and 1, being |1| the perfect correlation and must be statistically significant to be valid. The most commonly used correlation coefficients are: Pearson, Spearman and Kendall.

Pearson's correlation coefficient (Hair et al., 2020) measures the linear association between two quantitative variables and has several assumptions about the data: (a) the variables must be quantitative, (b) the relationship between the variables must be linear and (c) the data must have a normal distribution. If any of the assumptions are not

satisfied, Spearman's correlation coefficient should be used and if the variables are qualitative, Kendall's correlation coefficient should be used.

The objective was to develop a cross-sectional quantitative relational study between student engagement measured through *Blackboard* v9.1 analytics and their academic performance measured through their final grade.

Statistical methodology was applied to find out which hypothesis is true. It is desired that the errors in the acceptance of a hypothesis be of the smallest possible size, typically, we work with $\alpha < .05$ and $\beta < .20$, limits that have been adopted in this study.

First, the analytics of the *Blackboard* system available at the University and that can be consulted through the course evaluation and reports option were studied; nine reports were found among which two were selected for their relevance to the engagement study: the first one called "User activity in the content areas" shows all the activity of each student during the academic period and the second one called "Course activity information" shows the total time that the student dedicated to the course being active on the platform during the academic period. The details of these indicators are shown in Table 1 and the rationale for the decision on each indicator selected is shown in Table 2.

Table 1

Available reports on analytics in Blackboard v9.1

Number	Report name	Description
1	User activity in the content areas	Summary of the activity of all users in the course content areas between certain dates specified when requesting the report (maximum six months backward from the day the report is requested). Contains the number of clicks on a certain item, both in a table and graph format and also the number of requests per user to each of the content items and the total per user
2	Course activity information	General course activity, sorted by student and date. Data include total time and average time, measured in hours, that each student has in the course
3	Course coverage report	Displays information on course elements that have been aligned with University goals
4	Course performance	Performance of a course compared to a selected set of targets
5	General summary of user activity	Displays user activity for all course areas, as well as dates, times and days of the week for activities
6	Course user participation report	Number of user submissions in your course for activities, assessments, discussions, blogs and journals within the chosen time frame
7	Student overview for a course	A student's activity in the course, sorted by date. The data includes the total time the student has spent in the course
8	User activity in forums	Summary of the activity carried out by the user in the course discussion forums
9	User activity in groups	Summary of the activity carried out by the user in course groups

Table 2

Justification on the use of available Blackboard v9.1 reports

Number	Report name	Decision	Justification
1	User activity in the content areas	yes	This report was selected to analyze student activity in the introductory programming course since the theory on engagement, Mandernach (2015), has shown the relationship that exists between student behavior through their actions (behavior) and academic performance.
2	Course activity information	yes	This report was selected because there is theory (Halverson and Graham, 2019) and Henrie et al. (2015) that demonstrates that learner engagement is related to the time spent on a task.
3	Course coverage report	no	This report is not active at the University.
4	Course performance	no	This report is not active at the University.
5	General summary of user activity	no	The information in this report coincides with the information generated in the first report regarding student activity; it was not selected because it has greater detail that does not add value to the study that has been carried out
6	Course user participation report	no	This report is developed to comply with certain tuition refund laws in the U.S. and is not used at the University.
7	Student overview for a course	no	The data matches the data generated in report two, but must be obtained on a student-by-student basis.
8	User activity in forums	no	In the introductory programming course, discussion forums are not encouraged.
9	User activity in groups	no	In the introductory programming course, work in pairs is encouraged in the laboratory and in the final project; this work is face-to-face, it is not registered in *Blackboard*.

For the above, the study has three quantitative variables: student activity (ACT) from *Blackboard* report one, time spent by the student (TPO) from report two and student final grade (CF) from the University's central system.

To determine the sample size in the relational study, the suggestions of several authors were analyzed.

According to Hernández Sampieri and Mendoza Torres (2018), a sample size of 82 is suggested for a hypothesis test in a two-tailed correlation study. On the other hand, Morales Vallejo (2012) suggests investigating the relationship coefficient found by other authors to know the expected correlation coefficient and to consult the corresponding tables in Statistics books to find the sample size.

Several studies of correlation between student involvement and academic performance were analyzed, the results of which are shown in Table 3, and with the data obtained a weighted average was calculated to consider a moderate correlation of r =.3 in order to consult the tables that indicate the recommended sample size.

Table 3

Studies analyzing a relationship between student engagement and academic achievement

Scope	Coefficient of pearson correlation (behavioral)	n	Author(s)
Nursing Students in Egypt and Saudi Arabia	.290	425	Bayoumy and Alsayed (2021)
Psychology students in Uruguay	.110	589	Curione et al. (2019)
Education students in the Philippines	.208	305	Delfino (2019)
Business Alumni from two Universities in Sri Lanka	.452	318	Glapaththi et al. (2019)
Education students in Turkey. (Not first semester)	.255	304	Gunuc(2014)
University English students in Turkey	.290	294	Karabıyık (2019)
Students from three universities in Ethiopia (non-first year)	.548	530	Meseret and Ananda (2018)
Pharmacology students in Jordan	.774	144	Qetesh et al. (2020)
Nursing students in Iran	.630	310	Zare et al. (2017)

In consulting the tables to find the sample size, it was found to be size 85 with a confidence level $\alpha = .05$ and statistical power $(1- \beta)$ of .80; if the power is increased toward .90, the sample size is suggested to be 113.

Santa Barbara (2021) suggests sample size of 90 for a confidence level of $\alpha = 0.05$ and statistical power of .80. Pértegas Díaz and Pita Fernández (2002) suggest a similar size of 85, in both cases for a correlation coefficient $r = .3$. The authors suggest adding 10% to the sample size to overcome missing data.

There are also authors such as Clark-Carter (2019) who recommend consulting statistical tables available in Statistics books or using *software* such as G*Power to calculate the sample size by requesting an a *priori* study therein. The *software* was installed and the query was run, finding a sample size of 84 for a statistical power of .80 and 112 for a statistical power of .90.

Based on the authors consulted, a sample size of 125 participants was established for the relational study, representing the recommended sample size plus a percentage for possible missing data.

Subsequently, a non-probabilistic convenience sampling was carried out considering the total number of students who took the subject in the academic period January-May 2022 and a sample of 123 first semester participants was obtained, which included students registered in the introductory course of programming for engineering. Five participants were discarded because they exceeded the number of absences allowed during the semester. For 118 participants, selected analytics were extracted from the *Blackboard* system and subsequently in the University's central system, their final scores were identified. The data were integrated and anonymized.

When doing a relational study, the data should be examined to find out if they present a normal distribution (Hair et al., 2019) and thus use parametric statistics; if the data follow a distribution different from the normal, nonparametric statistics should be used; the authors explain that to detect whether the data present a normal distribution, the graphic methods that depend on a visual review and the formal methods of hypothesis contrast test where the most used statistics are Shapiro-Wilk and Kolmogorov-Smirnov are known; it is also recommended to observe the descriptive statistics of the behavior of the data, values of skewness and kurtosis close to zero will indicate that the data have a

normal distribution. Flores Tapia and Flores Ceballos (2021) explain that the Kolgomorov-Smirnov test should be applied for a sample size greater than 50, as is the case in the present study.

Based on the above, tests were made to decide whether to use parametric or non-parametric statistics to carry out the relational study using SPSS v28 *software* ; it was found that the data did not follow a normal distribution, so it was decided to carry out a relational study by calculating Spearman's rho coefficient in the same *software*.

Subsequently, statistical power calculation was performed using the G*Power 3.1 software of Faul et al. (2009) and applying the recommendations of Cárdenas Castro and Arancibia Martini (2014).

With the results obtained, the answers to the hypotheses raised in the study were written.

Results

To carry out the correlation study, we first analyzed the descriptive statistics of the variables studied, the results of which are shown in Table 4.

Table 4
Descriptive statistics of the variables

	n	Minimum	Maximum	Media	Standard deviation	Asymmetry	Standard error	Kurtosis	Standard error
ACT	118	35	652	225.16	115.14	1.219	0.224	2.113	0.444
TPO	118	11	208	56.58	33.85	1.535	0.224	3.776	0.444
CF	118	30	100	76.27	15.96	-0.896	0.224	0.490	0.444

The results of descriptive statistics of the study variables show that the data present a bias when observing their asymmetry, in the case of ACT and TPO they have a positive asymmetry, they present a bias to the right, higher frequencies are associated with lower values of ACT and TPO; in the case of CF a negative asymmetry is observed, a bias to the left, higher frequencies are associated with higher values of CF. In the case of kurtosis, the ACT and TPO values show a positive kurtosis, most of the values are close to the mean. The skewness and kurtosis values (Hair, 2020) would be close to zero if the distribution of these data were normal.

For each variable, a normality test was also performed to decide whether to use parametric (Pearson's correlation) or non-parametric (Spearman's correlation) statistical tests.

The normality test was performed considering the following hypothesis:

H_0: ACT and CF data do have a normal distribution

H_1: ACT and CF data have a distribution different from normal

The Shapiro-Wilk and Kolmogorov-Smirnov statistics were applied in SPSS v28. The results are shown in Table 5.

Table 5

ACT normality tests: student activity on the Blackboard and CF platform: Student's final grade

	Normality tests					
	Kolmogorov-Smirnov [a]			Shapiro-Wilk		
	Statistician	gl	Sig.	Statistician	gl	Sig.
ACT	.130	118	<.001	.920	118	<.001
CF	.136	118	<.001	.934	118	<.001

Note. [a.] Lilliefors significance correction

Once the normality study was done and given that the significance level was less than 0.05, we proceeded to reject H_0 , which indicates that the data have a normal distribution, so the data have a distribution different from normal and therefore, nonparametric statistics should be used for the relational study.

Similarly, normality test was performed for the indicator "Course activity information" which shows the total time (TPO) that the student dedicated to the course while active on the platform during the academic period, finding the results shown in Table 6 and with similar results to the activity indicator.

Table 6

Normality tests for the variables TPO (Time recorded in the Blackboard platform) and CF (student's final grade)

	Normality tests					
	Kolmogorov-Smirnov [a]			Shapiro-Wilk		
	Statistician	gl	Sig.	Statistician	gl	Sig.
TPO	.115	118	<.001	.896	118	<.001
CF	.136	118	<.001	.934	118	<.001

Note[a.] Lilliefors significance correction

To make the relational study between ACT ("User activity in the content areas") and CF (student's final grade), after investigating the distribution of the data, we proceeded as follows:

The relationship hypothesis of the study was established:

H_0: There is no relationship between a student's activity on the *Blackboard* platform and their final subject grade.

H_1: There is a relationship between a student's activity on the *Blackboard* platform and his or her final subject grade.

The significance level for all studies was considered to be 95%, that is, an α error of .05 is allowed and a statistical power (1- β) of 80% is sought.

Subsequently, correlational studies were performed, the results of which are shown in Tables 7 and 8.

Table 7

Spearman correlation between the Blackboard system activity indicator (ACT) and the student's final grade (CF)

Correlations				
			ACT	CF
Rho of Spearman	ACT	Correlation coefficient	1.000	.448***
		Sig. bilateral		<.001
		n	118	118
	CF	Correlation coefficient	.448***	1.000
		Sig. (bilateral)	<.001	
		n	118	118

Note.***. The correlation is significant at the 0.001 level (bilateral).

Table 8

Spearman correlation between the Blackboard recorded time indicator (TPO) and the student's final grade (CF)

Correlations				
			TPO	CF
Spearman's Rho	TPO	Correlation coefficient	1.000	.447**
		Sig. bilateral		<.001
		n	118	118
	CF	Correlation coefficient	.447**	1.000
		Sig. (bilateral)	<.001	
		n	118	118

Note.**. The correlation is significant at the 0.01 level (bilateral).

Once the relational studies had been carried out and given that the significance level was less than 0.05, we proceeded to reject H_0 , which indicates that the variables are not related, and therefore, H_1 , which indicates that there is a relationship between the variables, is accepted.

With the results obtained from the correlational studies, the statistical power was calculated in the G*Power *software* and the results can be seen in Figures 1 and 2.

Figure 1

Calculation of the statistical power for the relationship between student activity (ACT) recorded in the Blackboard system and the student's final grade (CF)

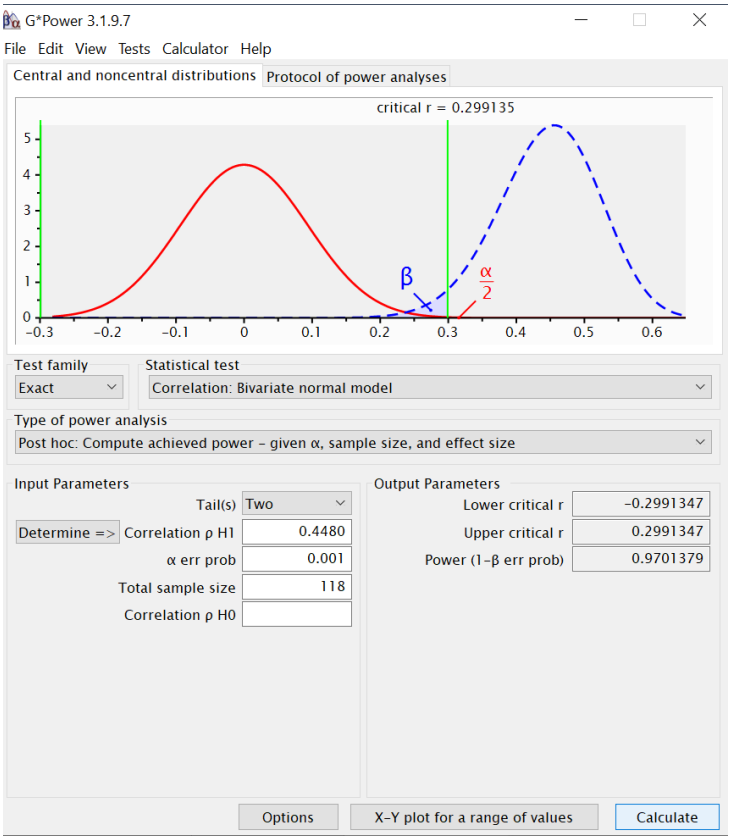
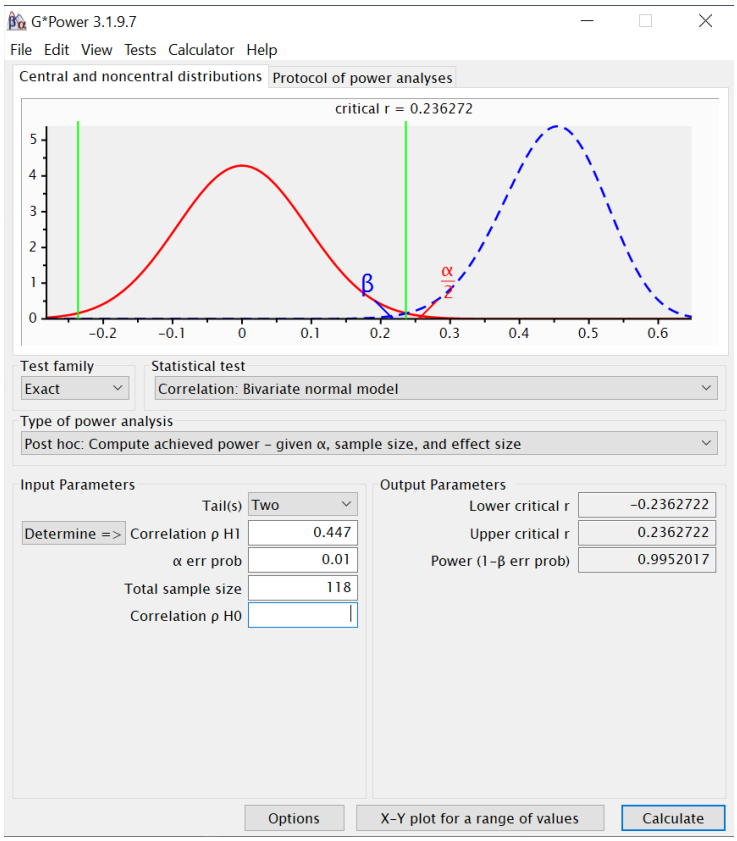


Figure 2

Calculation of statistical power for the relationship between student time spent (TPO) recorded in Blackboard and final grade (CF)



As can be seen in Tables 7 and 8, a moderate relationship was found considering the scale presented by Hair et al. (2020), significant and positive both between student activity on the platform and academic performance ($rho_{(116)}$=.448, p<.001 with statistical power of .970), and between time spent on the platform and academic performance ($rho_{(116)}$ =.447, p<.01 with statistical power of .995). These results support the research hypothesis and it is concluded that there is a relationship between the activity and time spent by the student in *Blackboard* and their final grade.

Effect size in a relational study, Clark-Carter (2019) expounds, is a measure of the amount of variance in one variable that can be explained by the variance in the other variable. It is calculated by squaring the correlation coefficient and multiplying by 100; the effect size in this study is 20.07% for student activity and final grade and 19.88% for time spent on the platform and final grade; the author considers this effect size as an effect located between medium and large in the Social Sciences.

Even though the relationship is moderate, considering the number of factors involved in student performance, the findings can be considered as results that help the teacher to promote focused student behavior during the course.

Discussion and conclusions

Based on the results, it can be concluded that both student activity and time invested by the student and recorded in Blackboard are positively and significantly related to their academic performance outcomes as measured by the final grade, which is

in agreement, as discussed by Atwell (2021), Halverson and Graham (2015), Henrie et al. (2015) and Kuh (2009) with the engagement theory that states that effort, persistence, and time on task are dimensions of cognitive engagement that manifest as an external form of learner behavior and reflect the actual investment of mental energy in learning, related in turn, significantly to academic performance.

The results also coincide with those obtained by various researchers who have studied the relationship between EMS analytics and academic performance: Ahmed and Mesonovich (2019) did a study in precalculus subject and found that there is relationship between the grades of the SGA activities and the student's final grade. Akai and Koral Gumusoglu (2020) found that, in language subjects, the use of an LMS predicts the student's final grade. Bulut et al. (2023) found that formative assessment outcomes (homework completion, turnaround time, grades) are significant predictors of the student's final grade. Darko (2021), using data from an LMS, analyzed the average time a student spent during their undergraduate studies in relation to their final grades and found a positive and significant correlation. Firat (2016), found that there is a relationship between analytics of an LMS and the final grade, particularly, the time invested by the learner. Fleur et al. (2023) designed an additional board to show students their analytics and claim that its social impact positively influenced motivation and final grades. Liz-Domínguez et al. (2022) found correlation between analytics of an EMS and final grade for students taking Computer Science for Architecture for the first time. Shayan and van Zaanen (2019) found that student activity is a predictor of their final grade from the second half of the academic term onwards. On the other hand, Saygili and Çetin (2021) did a meta-analysis to study the relationship between the analytics of an EMS and the final grade in Mathematics and found a low relationship. Broadbent (2016) asserts that it is student self-efficacy and not the analytics of an EMS that has a relationship with academic performance.

Limitations and proposals for continuity

Even though the results are considered positive because they guide towards future observations on indicators of student involvement related to their academic performance, they cannot be generalized to the population because the subject has only been studied in engineering programs at one university. Examining Blackboard analytics at different universities would provide a better picture for building a model related to the introductory programming subject. It should also be considered that the population studied belongs to a region of Mexico and the analytics come from Blackboard, extending the study to the whole country and including analytics from other platforms would be enriching. The student's background has not been studied and would be another factor to consider. The correlation found does not guarantee a cause-effect relationship between the study variables. Future research could also study student motivation and perceptions of the Blackboard platform, as well as comparing the results with other indicators of student engagement. Qualitative research could also be done through interviews with students who do not exhibit active behavior on the Blackboard platform.

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REVIEW OF STUDIES WITH AN ORIENTATION TO PROJECT METHODOLOGIES FOR ARCHITECTURAL EDUCATION PRACTICES

REVISIÓN DE ESTUDIOS CON ORIENTACIÓN A LAS METODOLOGÍAS PROYECTUALES PARA LA ENSEÑANZA EN ARQUITECTURA

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ABSTRACT

Project development is one of the essential skills that is intended to be strengthened when training architects in the academic field. However, methods and processes to develop projects are either not established or vary in structure and sequence, responding to various themes and variables in the faculties of architecture. Due to this, in this article, different studies are reviewed with an orientation to design development methods for architecture teaching to find relevant data, find common aspects and define the most critical variables that guide these investigations. A literature review method is used by which investigations closely related to the subject are chosen by applying exclusion criteria. The information obtained is processed through descriptive statistical analysis, organizing and tabulating the data. Subsequently, the most relevant findings are reflected, analyzed, and described. The main results of this article show that the methods used in the investigations studied are primarily qualitative and focus on methodological, analytical, reflective, and pedagogical aspects. Additionally, the essential variables that influence and lead these investigations are: impact on the context and society, activities and tools, coherence in the process, and project specificity, which represent a guide for future analysis studies or project methodology proposals for architectural education practices.

Palabras clave:
enseñanza de la arquitectura, arquitectura, diseño arquitectónico, enseñanza superior

RESUMEN

El desarrollo de proyectos es una de las habilidades esenciales que se pretende fortalecer en el ámbito académico en la formación de arquitectos. Sin embargo, los métodos y procesos para elaborar proyectos o no están establecidos, o varían en estructura y secuencia respondiendo a diversas temáticas y variables en las facultades de arquitectura. Debido a esto, en este artículo se revisan diferentes

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estudios con orientación a métodos de desarrollo proyectual para la enseñanza en arquitectura para hallar datos relevantes, encontrar aspectos en común y definir las variables más críticas que conducen estas investigaciones. Se utiliza un método de revisión de la literatura mediante el cual se eligen investigaciones íntimamente relacionadas con la temática aplicando criterios de exclusión. La información obtenida es procesada mediante análisis estadísticos descriptivos, organizando y tabulando los datos. Posteriormente se reflexiona, analiza y describen los hallazgos más relevantes. Los principales resultados de este artículo, muestran que los métodos utilizados en las investigaciones estudiadas son mayoritariamente cualitativos y se enfocan en aspectos metodológicos, analíticos, reflexivos y pedagógicos. Adicionalmente, las variables esenciales que influyen y conducen estas investigaciones son: impacto en el contexto y la sociedad, actividades y herramientas, coherencia en el proceso y especificidad proyectual, por lo que estas representan una guía para futuros estudios de análisis o propuestas de metodología proyectual en arquitectura.

Introduction

The development of architectural projects needs to obey a structured sequence of stages and phases in order to obtain useful results. For this reason, it is imperative to review the studies oriented to the Project Development Methodologies (PMM) in order to identify relevant aspects considered in these processes and to organize the activities so that they are as consistent and coherent as possible. According to the *Project Management Institute* (PMI), it tells us that project management should have a life cycle and follow a logical sequence of steps such as: analyze the feasibility of the project, design, build, test, deploy and close the project. It also indicates that there are several standards related to behaviors, actions and approaches to project development, being the Predictive approach, one of those used for the management of architecture and construction projects.

> A project to develop a new community center could use a predictive approach to land and facility construction. The scope, schedule, cost and resources would be determined in advance, and changes would likely be minimal. The construction process would follow the plans and blueprints (PMI, 2021, p.36).

On the other hand, when we focus specifically from the point of view of the process for architectural design, Velázquez (2016, p. 861) tells us that:

> The project methodology never ceases to be nourished by new conceptualizations and theoretical positions in the face of the challenge of working on the transformation of the habitat. The making of architecture entails in itself the notion of a craft that, over time, gains in technique or more precisely in the design method. The project as a true object of permanent learning implies putting into action the practice of devices-tools to address the problems of the case.

This methodology must be in constant improvement and transformation in relation to the project conditions and involves the use of various activities, strategies and tools to provide an adequate solution to the design problem. This project method should be understood as a process of cognition that promotes the production of new concepts. The above, in order to contribute with new ways or paths to carry out the research and this process from the conceptual and procedural point of view (Burgos, 2016).

The PMI offers us several principles and guidelines to develop projects, of which we have: adapt according to the context, which is imperative to take into consideration for the field of architectural project design.

> Project success is based on adapting to the unique context of the project to determine the most appropriate methods to produce the desired results. Adapting the approach is iterative, and therefore is an ongoing process throughout the project (PMI, 2021, p. 44).

As in project management, architectural design must take into account contextual needs and perform cyclical iteration processes to find possible improvements to the project. The activities that are contained within this process have the ultimate goal of generating a project that is oriented to satisfy a need and that are structured in a defined and clear method, with this process having the same or even a higher level of importance than the final result itself.

However, the *Royal Institute of British Architects* (RIBA, 2020) points out that the process specifically for the design of architectural projects is not fully established or formally recorded in many countries and that, moreover, the manner in which it is designed often follows informal and haphazard sequences. The consequence of this is that the informality in the elaboration of projects is transmitted between generations of architects, without finding a point of convergence or agreement. According to Correal et al. (2015, p. 24):

> For many years of teaching architectural design in our schools, the vast majority of teachers have reproduced the forms adopted by professional practices for the solution of projects, so that each generation of architects does the same with minor variations in content and instrumentation, as a result of the historical and cultural moment in which they develop.

Therefore, the MDPs should be reviewed and studied, and university professional training in architecture should encourage the updating of these processes, so that the educational environment is not simply a repetition of what is customary in the profession, but rather a logical and coherent process, linked to the needs of the community (Ríos-Gutiérrez and Sánchez-Macías, 2022). The constant revision of the methods applied in academia, must start from research, which is one of the essential purposes of universities, so Quinte (2015, p. 37) states that:

> Research is an essential and mandatory function of the university, which promotes and carries it out, responding through the production of knowledge and development of technologies appropriate to the needs of society, with special emphasis on the national and international reality.

This production of knowledge through research must respond to methodologies that are constantly being updated so that they do not become outdated in time, nor are they the continuous reproduction of past schemes, as is often the case with MDP applied to architectural projects.

Higher Education Institutions (HEIs) have the responsibility to promote research in various forms, focusing on current problems and impacting local and national social development (Rodriguez, Cano, & Velez, 2018). For this reason, training professionals to meet both economic and sociocultural needs is a constant challenge (Garbizo et al., 2021). This challenge must be assumed by the faculties of architecture, which must clarify, update and identify the key variables and methodological processes oriented to research for the production of architectural projects.

However, as shown above, the lack of a clear methodological process to solve projects has the consequence that these deficiencies affect the academic training in architecture, which is exposed by commenting that:

> The teaching of the architectural discipline rests on a base that has remained in many aspects static, the scarce clarification has not allowed drawing clear distinctions that sustain the action of the teaching of the project on a common basis of shared conventions, beyond the planimetric and spatial language, projective means of representation par excellence (Medina et al., 2017, p. 18).

This lack of clarity and specificity in the methods of development of architectural projects, originate divergences and discrepancies within the same educational process. As a consequence of the above, the projects generated lack support and weight, which is why there is an imperative need to review the studies oriented to current project methodologies, propose new and cutting-edge models (Martínez et al., 2020), study and

analysis tools (Figueroa and Guaraz, 2021) and identify the most important variables that influence the development of projects to be applied in the educational field of architecture.

Method

This article uses a methodology based on the Petticrew and Roberts (2008) literature review guide for the social sciences to review the research found.

A search of research was made in Google Scholar, Scielo, Scopus and Redalyc databases with orientation to the study of project methodologies in architecture from 2013 to 2022, from which 167 results were obtained. Subsequently, only qualitative or mixed research that described, reflected on or analyzed academic methods for the development of architectural projects was chosen. It is worth mentioning that only studies in Spanish were chosen and duplicate articles were eliminated. Consequently, 35 studies were analyzed in this article.

The data were processed using descriptive statistical analysis by means of frequency tables and summary graphs to classify the investigations by means of percentages and quantities. The review of the studies analyzed here were organized and tabulated in Excel using the following data: Number of studies per year, Type of publications, Countries of publication, Methodology applied, Focus of the study, Recurrent topics and Relevant variables. Subsequently, descriptions are made of the findings and essential elements found in response to the research questions.

Results

Study criteria and questions

The research selected and studied in this article was subjected to seven questions that respond to the following criteria: number per year, type of publication, country, methodology, approach, topics and variables (see Table 1). The answer to these questions allows us to obtain relevant data for the knowledge of the state in question and to deepen the study of each of these investigations.

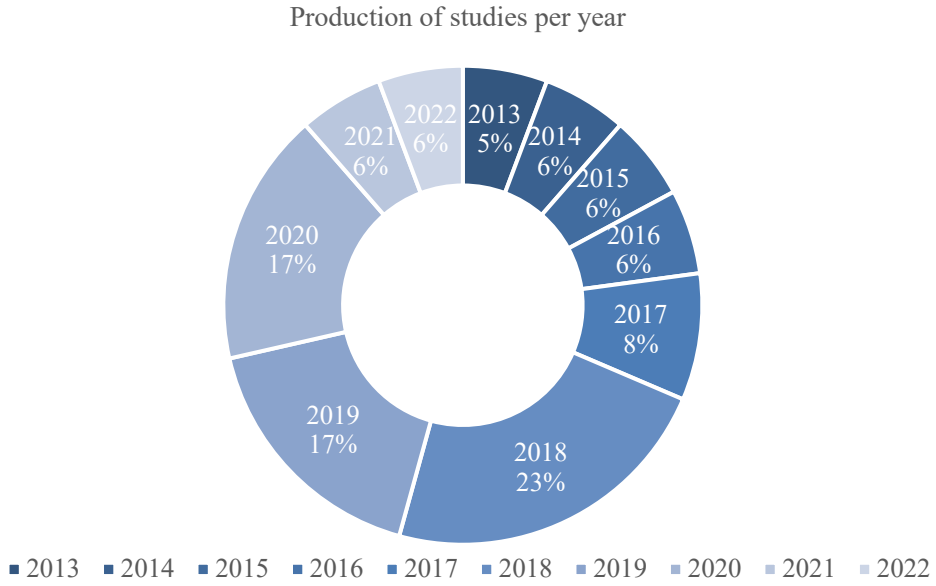
Table 1
Study questions

No.	Criteria	Questions
C1	Production of studies per year	What is the production of published studies oriented to project development methods for architectural education per year?
C2	Type of publications	What types of studies are published with a focus on design development methods for architectural education?
C3	Countries of publication	Which countries publish studies oriented to design development methods for architectural education?
C4	Methodology applied	What type of methodology is applied in studios oriented to project development methods for teaching architecture?
C5	Focus of the study	What is the approach used in studies oriented to project development methods for teaching architecture?
C6	Recurring themes	What are the most recurrent themes found in studies oriented to project development methods for teaching architecture?
C7	Relevant variables	What are the most relevant variables that drive studies oriented to project development methods for teaching in architecture?

Production of studies per year

As shown in Figure 1 and based on criterion C1 (Number of studies per year), the research reviewed here is between 2013 and 2022. It is observed that there was a sustained increase in the number of studies on project development methods for teaching in architecture since 2017 (8%), with 2018 being the year of highest production, constituting 23% of the total number of publications. This number of studies remained high in 2019 (17%) and 2020 (17%).

Figure 1
Production of studies per year

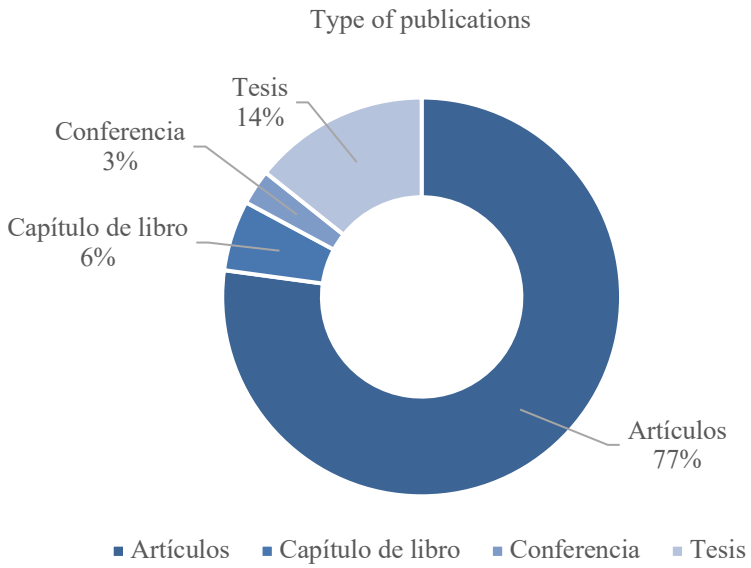


Type of publications

With respect to criterion C2 Type of publications (see Figure 2), four were identified: articles, theses, book chapters and conferences. The vast majority represent articles with 77%. On the other hand, theses on this subject account for 14%. It is worth mentioning that some of the articles reviewed are part of postgraduate studies, so several of them are part of graduate thesis works. Book chapters make up 6%, while conferences represent the lowest percentage with only 3%.

Figure 2

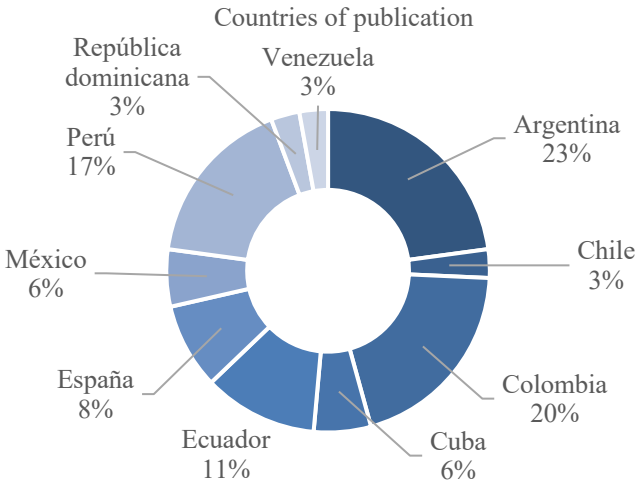
Type of publications



Countries of publication

Considering criterion C3 (Countries of publication), the following results were obtained: most of the production is in South America with 77%, with Argentina in first place with 23%, followed by Colombia with 20% and then Peru (17%) in third place. Ecuador (11%) ranks fourth and Spain (8%) fifth. Cuba and Mexico follow with 6% in both cases, followed by Chile, the Dominican Republic and Venezuela, which together account for 9% (see Figure 3).

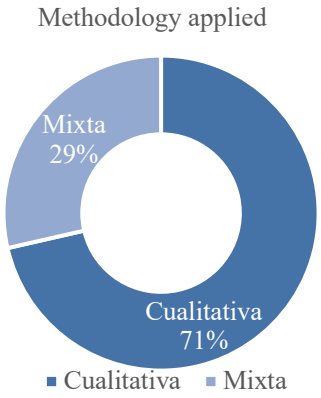
Figure 3
Countries of publication



Methodology applied

As shown in Figure 4, in criterion C4 (Methodology applied), it was found that 71% of the research analyzed belonged to a qualitative type of research. This is due to the description and characterization of concepts and methods focused on pedagogical methods for the generation of architectural projects. On the other hand, research that mixes qualitative and quantitative methods represents 29%, containing numerical and statistical data as well as descriptions.

Figure 4
Methodology applied

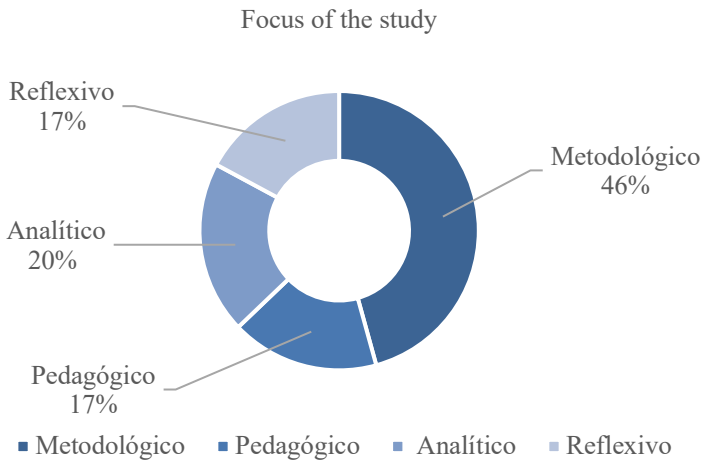


Focus of the study

Criterion C5 (Study approach) was evaluated and it was found that 46% of the research belonged to the Methodological approach. They propose methods for the development of architectural projects in academic environments, mentioning the structure and the steps that must be followed in order to practice them successfully. On the other hand, 17% belong to the Reflective approach, in which they focus on meditation and questioning the current methods of pedagogy in architecture and the current state of the art in project development. In the case of the analytical approach, they represent 20% and focus on critical analysis of existing methodologies and their impact on current

educational practices. Finally, the Pedagogical approach (17%), in which efforts are evoked to propose new teaching methods for the development of architectural projects from a didactic point of view (see figure 5).

Figure 5
Focus of the study



Recurring themes

To respond to criterion C6 (Recurrent Themes), the studies reviewed are organized on the basis of the approaches established in the previous criterion, with 16 studies having a Methodological approach, 7 having an Analytical approach, 6 having a Reflective approach and 6 having a Pedagogical approach, as shown in Table 2.

Table 2
Authors by focus

Approach	Authors
Methodological	Bejarano (2017), Bocanegra-Herran (2019), Burgos (2016), Burgos (2017), Cardet (2019), Casares and Raya de Blas (2019), Heinzmann et al. (2015), Martínez (2021), Martínez (2013), Millán-Millán (2020), Mundo (2020), Pedreño (2018), Putallaz et al. (2018), Ríos-Gutiérrez and Sánchez-Macías (2022), Rodríguez, Giordano and Domínguez, (2018), Velázquez (2016)
Analytical	Muntañola and Saura (2013), Correal et al. (2015), Fisch et al. (2014), Alvarado (2019), Figueroa and Guaraz (2021), Tami-Cortes and Coronel-Ruiz (2018), Montoro (2018)
Reflective	Medina et al. (2017), Fernandez et al. (2018), Hidalgo (2020), Castro-Mero (2020), Martínez and Valdés (2020), Bermeo and Echeverría (2022)
Pedagogical	Torres and Padrón (2014), Perlaza and Betancourt (2018), Sandoval (2018), Valdivia (2019), Arteaga (2019), Martínez et al. (2020)

The research studies were analyzed by approach to find possible similarities in the topics addressed and their frequency, so we began with a summary of each of the studies.

In the case of studies with a Methodological approach, it is worth mentioning that Bejarano (2017) proposes a methodology that contains three dimensions: environmental, social and economic, also indicating that the stages of awareness (for the community and the environment), research (analysis of the problem) and design process (from macro to micro) should be followed. Similarly, Bocanegra-Herran (2019) develops a project process, which should have four phases: graphic proposal (considering the terrain and spaces), design decisions (taking into account the areas of spaces and dimensions), sustainability aspects (with the community and the context) and the use of the space (being aware of its value).

Ríos-Gutiérrez and Sánchez-Macías (2022) propose a design methodology linked to University Social Responsibility (USR), which contains research and design stages, as well as three transversal activities: cooperation with external entities, interaction with the community and background analysis. They specify various phases such as: Identification of social and infrastructure problems, sizing, land determination, urban impact and project development from macro to micro. On the other hand, Burgos (2017) proposes three important phases within the design method: the analysis phase (study of the place, context and user), the problem phase (definition of the user and needs) and the design phase (design strategies based on the study).

Millán-Millán (2020), argues that design methods should be cyclical and iterative for appropriate improvements. It proposes a series of competencies to be followed in the process, such as: analysis and synthesis of the needs and context, proposing organizations and relationships between the project and the site, developing the formal and spatial proposal, drawing up graphics and defining the construction criteria. While Cardet (2019), proposes to follow a project process that includes first the study and analysis of a real contextual problem and then make design proposals as a solution to the problem. Martinez (2013), proposes a sequence of activities that must be followed in the design method to solve an architectural problem, which are: the correct identification of the problem, data collection and analysis, and the formulation of solutions.

Casares and Raya de Blas (2019), propose that, in order to develop a design method, the following phases must be taken into account: data collection, interpretation, elaboration and execution. They must demonstrate competencies in the elaboration of architectural and urban ideas, composition and constructive and structural aspects. While Burgos (2016) supports a project methodology in which four variables are identified: disciplinary knowledge (function, space, form and technology), situational knowledge (problem, needs, context), project thinking (reflection, exploratory) and project knowledge (research, proposal and representation). On the other hand, Heinzmann et al. (2015), argue that, in the architectural design process, there must be specific moments or sequences which are: inquiry - reflection, preconfiguration - production and proposal - articulation.

Rodríguez, Giordano and Domínguez (2018), propose that, within the project methods, theoretical, practical and cooperation aspects between teachers and students should be taken into account, in addition, the stages: sustenance of ideas, feedback and experiential activities should be carried out. For his part, Velázquez (2016) argues that there are three variables within the project development process: experimentation, reflection and concretion. Within this process, concepts of proportion, modulation and function must be incorporated through planes and volumes. While Pedreño (2018), argues that an important part within the design processes is the study of analogous cases prior to the development of projects to learn from them, avoid possible mistakes and determine possible design strategies.

Mundo (2020), proposes a project method linked to strategies of: work teams, analysis of the site, field visits, workshops with the inhabitants, presentation of proposals and communication of results for feedback. Similarly, Putallaz et al. (2018), sustain that experiential learning contributes in a positive way to apply the criteria of inclusion and accessibility within the project methods in architecture. These activities are related to the simulation of people with different abilities to measure the sensitizing effect on students. On the other hand, Martínez (2021) defines that the design processes should be evaluated based on three important competencies: the design imprint (support, proposal and formal presentation), the architectural research (problem, development and support) and the architectural program (strategies, procedure and support).

When studying research with a methodological approach, there is a general interest in proposing project methods and establishing a consensus for the generation of architectural projects. The topics found in the studies of this approach were diverse; however, they were ordered according to their orientation with the stages and topics indicated. It is found that two important stages are proposed to be followed: Research and Design.

These studies were first organized based on the Research stage. Therefore, the following topics have been identified: Problem Identification, User Analysis and Context Study as shown in Table 3.

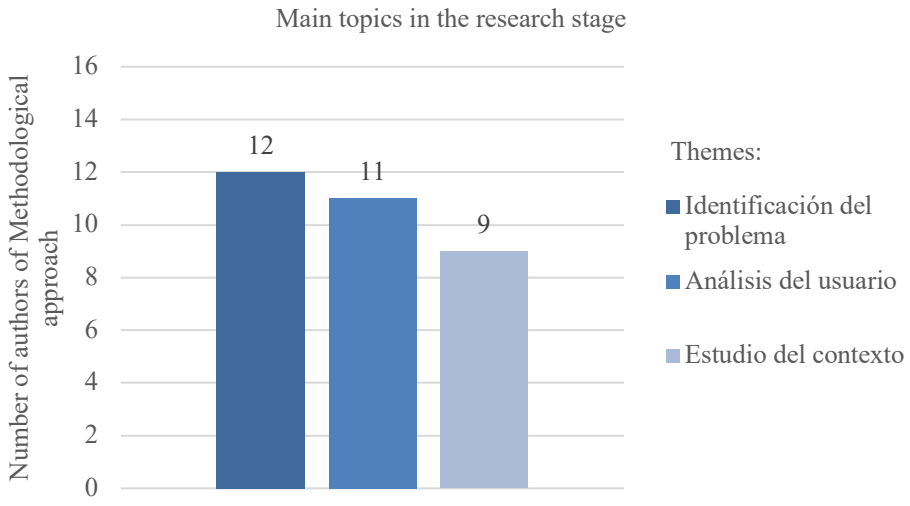
Table 3

Authors of Methodological approach by subject in Research stage

Stage	Themes	Studies
Research	Identification of the problem	They indicate that there must be a clear and concrete definition of the problem to be addressed based on objective and real data (Bejarano, 2017; Burgos, 2016; Burgos, 2017; Cardet, 2019; Casares and Raya de Blas, 2019; Heinzmann et al., 2015; Martínez, 2013; Martínez, 2021; Millán-Millán, 2020; Ríos-Gutiérrez and Sánchez-Macías, 2022; Rodríguez, Giordano and Domínguez, 2018; Velázquez, 2016).
	User analysis	They point out the importance of the study and the link with users or the community, analyzing their characteristics and identifying their needs (Bocanegra-Herran, 2019; Burgos, 2016; Burgos, 2017; Casares and Raya de Blas, 2019; Martínez, 2013; Martínez, 2021; Millán-Millán, 2020; Mundo, 2020; Pedreño, 2018; Putallaz et al., 2018; Ríos-Gutiérrez and Sánchez-Macías, 2022).
	Context study	They stress that there must be a deep knowledge of the place and the real context linked, in addition, to the environment and sustainability (Bejarano, 2017; Bocanegra-Herran, 2019; Burgos, 2016; Burgos, 2017; Cardet, 2019; Martínez, 2013; Millán-Millán, 2020; Mundo, 2020; Ríos-Gutiérrez and Sánchez-Macías, 2022).

As can be seen in Figure 6, of the total of 16 studies focused on the Methodological aspect, 12 authors focus on Problem Identification, 11 on User Analysis and 9 on Context Study.

Figure 6
Number of studies of the Methodological approach by topic at the Research stage



An analysis was made of the same 16 investigations, but based on the Project stage, to find concurrent themes. The following topics are identified: From general to specific, adequately provide the project and functional, spatial, formal and structural aspects as shown in Table 4.

Table 4

Authors of Methodological approach by subject matter in the Design stage

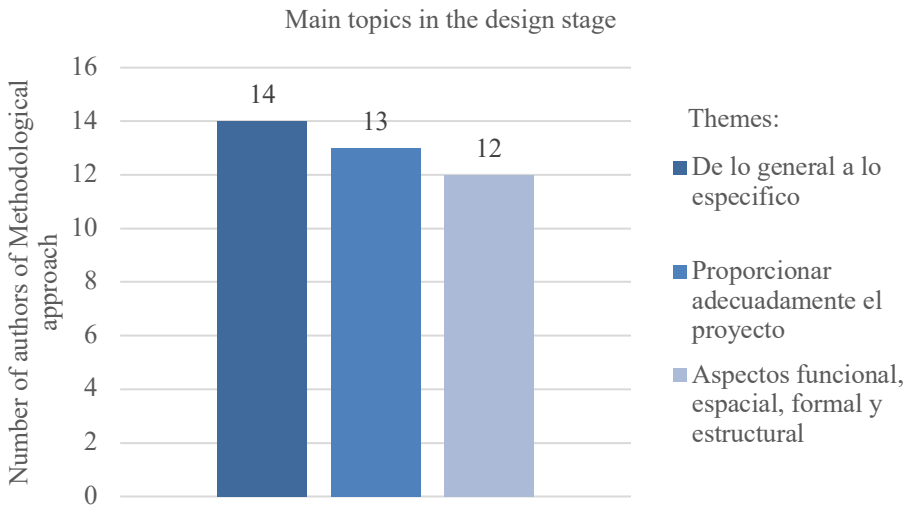
Stage	Themes	Studies
Projectual	From general to specific	They comment that the projective process must go from the macro to the micro, from the basic general ideas, to the architectural and constructive specificity (Bejarano, 2017; Bocanegra-Herran, 2019; Burgos, 2017; Cardet, 2019; Casares and Raya de Blas, 2019; Heinzmann et al., 2015; Martínez, 2013; Martínez, 2021; Millán-Millán, 2020; Mundo, 2020; Pedreño, 2018; Ríos-Gutiérrez and Sánchez-Macías, 2022; Rodríguez, Giordano and Domínguez, 2018; Velázquez, 2016).
	Adequately provide the project	They argue that the right size of the project should be defined based on user and context analysis (Bejarano, 2017; Bocanegra-Herran, 2019; Burgos, 2016; Burgos, 2017; Cardet, 2019; Casares and Raya de Blas, 2019; Heinzmann et al., 2015; Martínez, 2013; Millán-Millán, 2020; Mundo, 2020; Ríos-Gutiérrez and Sánchez-Macías, 2022; Rodríguez, Giordano and Domínguez, 2018; Velázquez, 2016).
	Functional, spatial, formal and structural aspects	They indicate that within the project methodology, aspects of function, space, form and structure should be worked on through images in two and three dimensions (Bocanegra-Herran, 2019; Burgos, 2016; Burgos, 2017; Casares and Raya de Blas, 2019; Cardet, 2019; Martínez, 2021; Millán-Millán, 2020; Mundo, 2020; Putallaz et al., 2018; Ríos-Gutiérrez and Sánchez-Macías, 2022; Rodríguez, Giordano and Domínguez, 2018; Velázquez, 2016).

Note. This table shows the classification of authors in relation to their subject matter in the Projective stage, including a summary of the aspects dealt with.

As shown in Figure 7, of the total number of studies focused on the design aspect, 14 authors focus on the theme From the general to the specific, 13 on Providing the project adequately and 12 on Functional, spatial, formal and structural aspects.

Figure 7

Number of Methodological approach studies per topic in the Design stage



As for the studies with an analytical approach, the authors examine existing design methods to find their strengths or opportunities for improvement. Alvarado (2019), analyzes the project process and the link it has with the community, highlighting three important dimensions: participatory, contextual and projectual. He concludes that the work of architecture is to generate coherent projects through participatory and functional processes to improve the environment. On the other hand, Correal (2015) states that the teaching of project methods has been limited to copying and repeating professional practices, causing a lack of relevance to educational practices, he also comments that methods of analysis and innovation are relevant. Additionally, he argues that an important competency is contextual understanding and defines three important processes: Occupy the territory, plan the improvement and analysis of the site and composition of the project.

Figueroa and Guaraz (2021) explore various strategies for teaching project methodologies to study social space. It explores analysis tools for the development of projects through background information, oriented to achieve a coherent process between the concept and the form of the project. For their part, Muntañola and Saura (2013) argue that project-based pedagogical methods in architecture should not obey superfluous reasons without taking a contextual basis, as this generates inconsistencies in academic results, so a logical and coherent process should be followed. In the case of Fisch et al. (2014), the development of housing projects should promote accessibility and integration to achieve a relationship with the city context and foster social awareness.

Tami-Cortes and Coronel-Ruiz (2018), analyze the current situation of relationship between architecture faculties and their graduates to assess their social impact. The authors recommend that follow-up processes be carried out to identify possible future improvements in academic practices and their impact on society. As for Montoro (2018), he analyzes soft skills in teaching practice in the faculty of architecture to assess the impact that learning is generated to develop architectural projects. They conclude by distinguishing the most important ones: assertiveness, empathy and good listening.

According to the study of research with an analytical approach, there are recurring themes that are of interest to the authors. These themes are as follows: Stages in the project methods, Social awareness and Understanding the context, which have been organized in Table 5.

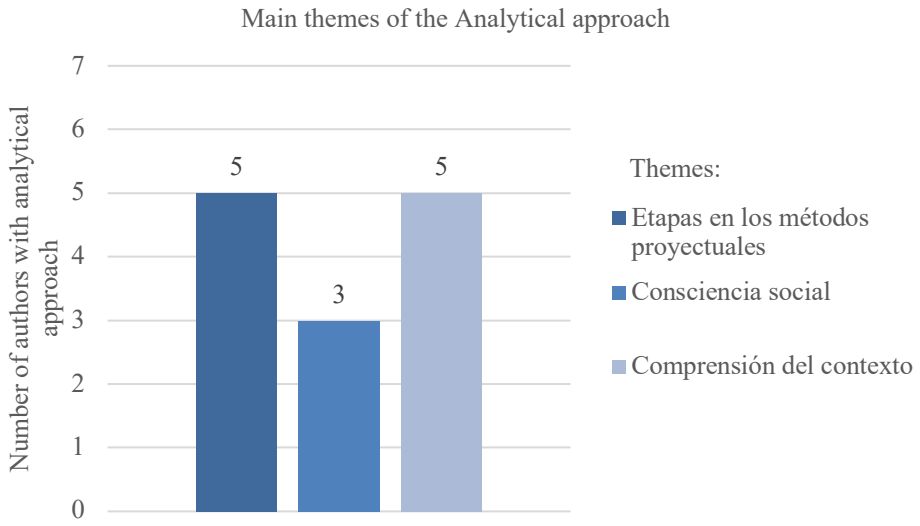
Table 5

Analytical approach authors by subject

Themes	Studies
Stages in design methods	They determine that the logical sequence of steps is important to ensure obtaining a coherent project (Alvarado, 2019; Correal, 2015; Figueroa and Guaraz, 2021; Montoro, 2018; Muntañola and Saura, 2013).
Social awareness	They indicate that society and community should be important axes guiding the projective method (Alvarado, 2019; Fisch et al., 2014; Tami-Cortes and Coronel-Ruiz, 2018).
Understanding the context	They point out that knowledge of contextual characteristics is imperative to develop projects (Alvarado, 2019; Correal, 2015; Fisch et al., 2014; Muntañola and Saura, 2013; Tami-Cortes and Coronel-Ruiz, 2018).

Of the total number of studies focused on the Analytical aspect, 5 authors focus on Stages in project methods, 3 on Social awareness and 5 on Understanding the context as shown in Figure 8.

Figure 8
Number of studies of the Analytical approach by topic



On the other hand, according to the Reflective approach studies, researchers meditate on the current reality of design methods and their influence and impact on society and context. Bermeo and Echevarría (2022) reflect on the importance of the integrative professorship for the development of design methods in architecture, taking into account conceptual and research elements, encouraging participation, field analysis and teaching support. For this reason, they analyze the current state of the academic curriculum, arguing that it must be constantly updated. On the other hand, Medina et al. (2017), analyzed the lack of systematization and specificity of the concepts that are transmitted to architecture students. To this end, they analyzed cases of previous educational experiences in project workshops. Their results point to contradictions within the project development process due to the lack of specificity and detail in the communication of ideas and concepts. While Hidalgo (2020) reflects on the pedagogical assumptions that are included in the methodologies of project development, which are interdisciplinarity, the participatory method and practice.

Martínez and Valdés (2020), reflect on the awareness of the practice of environmental care values and the reduction of social differences from the development of architectural projects. However, they comment that tangible results are not yet evident due to the disconnection of the methods with social and environmental characteristics, so it is important to review the teaching staff and the institutional policy. Fernández et al. (2018) reflect on the university's commitment to improving society through architectural projects. They mention that environmental, contextual and economic variables must be considered in order to develop equitable projects. It tells us that social problems must be addressed integrated to the conditions of the environment. While Castro-Mero (2020), studies and meditates on the impacts on the learning processes of architecture students in relation to Covid-19 through a documentary review. It is concluded that forward-

looking education for architects should encourage the use of digital tools and competencies that benefit society and the environment.

According to what has been studied in relation to the analysis of research with a reflexive approach, a review is made of the current methods, characteristics and values put into practice in the development of architectural projects. In these investigations we find recurrences of reflection on the themes of: Project process and methodologies, Commitment to society and the environment, and Digital competencies and tools, which are shown in Table 6.

Table 6

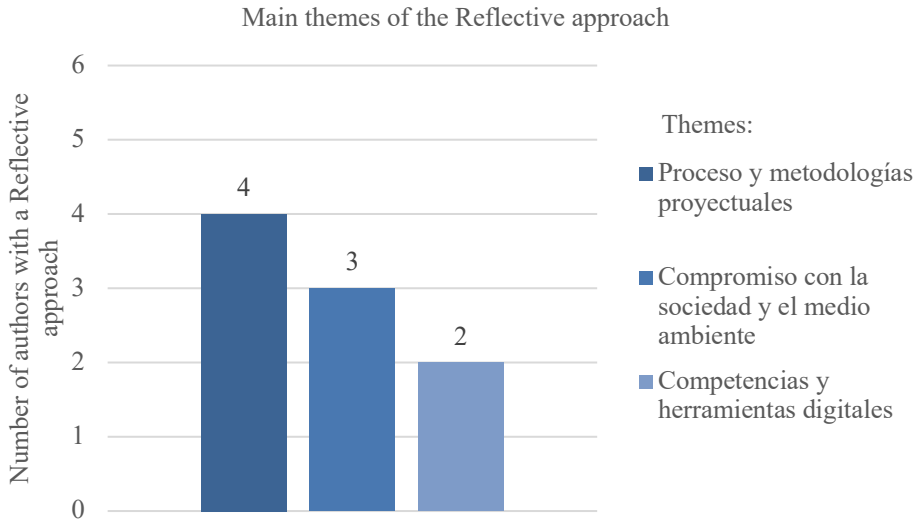
Authors with a Reflective approach by subject

Themes	Studies
Project process and methodologies	They reflect on the methods, activities and guidelines to carry out a project properly (Bermeo and Echevarría, 2022; Hidalgo, 2020; Martínez and Valdés, 2020; Medina et al., 2017).
Commitment to society and the environment	They meditate on responsibility in the development of projects for the improvement of society and context (Castro-Mero, 2020; Fernández et al., 2018; Martínez and Valdés, 2020).
Digital skills and tools	They reflect on the tools used in project methods and the competencies to be promoted (Castro-Mero, 2020; Hidalgo, 2020).

Of the total number of studies focused on the Reflective aspect, 4 researchers meditate on the Process and project methodologies, 3 reflect on the Commitment to society and the environment, while 2 focus on Competencies and digital tools as can be seen in Figure 9.

Figure 9

Number of studies of the Reflective approach by topic



Finally, on the Pedagogical approach research, the authors propose activities and didactic strategies that should accompany the development process of architectural projects. Valdivia (2019) comments that, in the educational field, project-based learning fosters critical thinking in architectural education. It proposes six stages of the pedagogical strategy, which are: mission and participants, diagnosis, objectives, planning, implementation and application. While Arteaga (2019) argues that collaborative learning is fundamental for project development, as teamwork and interpersonal skills are fostered. The importance of skills such as responsibility, listening, empathy, punctuality and tolerance are highlighted in order to achieve collaboration and success in the development of projects. On the other hand, Perlaza and Betancourt (2018) elaborate an innovative pedagogical proposal that includes reflection on accessibility and equity and recognition of the impact of architectural projects on the community. This was achieved through discussions, empathy experiences with users, practical workshops and participatory talks.

Martínez et al. (2020), propose a methodology for project development in which ten important axes should be taken into account: The internal context of the workshop, the external context, collaboration and cooperation, equipment, the role of the teacher, the role of the student, teaching quality, inclusion and diversity, evaluation and time. While Sandoval (2018) argues that training in the development of architectural projects is important to be able to solve problems and improve the quality of life of populations. He argues that there are three formative elements: practical training, social responsibility and the teaching role, key points for the training of architects and for fostering critical thinking and the improvement of society. On the other hand, Torres and Padrón (2014) stress the importance of knowing how to translate social needs into projects and tell us that the pedagogical foundations for the training of architects who are at the height of society are the development of values and responsibility, having as critical characteristics: the reflective, participatory, creative, problémico and collaborative.

Based on the analysis of research with a pedagogical approach, an interest is identified in proposing and implementing activities that encourage reflection and criticism of the different social realities, in addition to encouraging participation through workshops and collaborative activities. In these studies we frequently find the topics of: Reflective, creative and critical activities, Conversations, lectures and workshops, and Project and problem-based learning, as shown in Table 7.

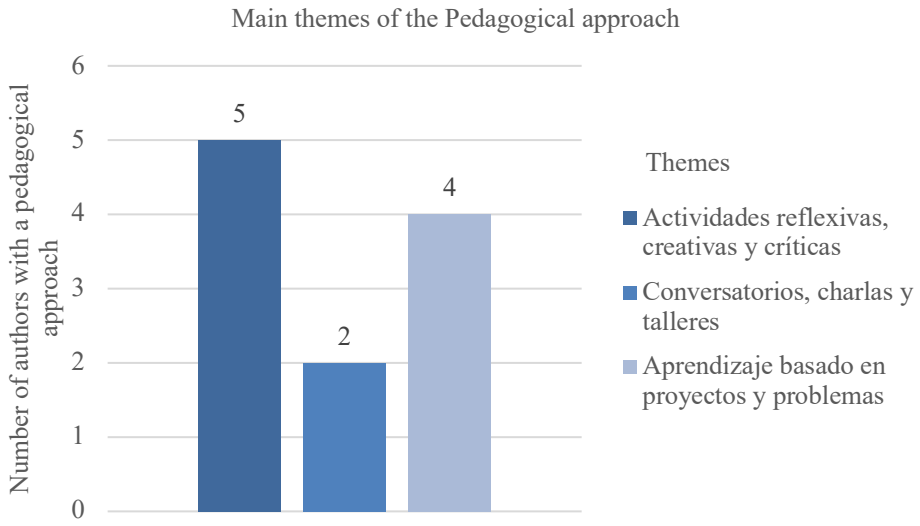
Table 7

Pedagogical approach authors by subject matter

Themes	Studies
Reflective, creative and critical activities	They determine that within the project methods critical and reflective thinking should be encouraged (Martínez et al., 2020; Perlaza and Betancourt, 2018; Torres and Padrón, 2014; Sandoval, 2018; Valdivia, 2019).
Talks, lectures and workshops	They indicate that the process for project development should be enhanced through activities that encourage the sharing of ideas and experiences (Martínez et al., 2020; Perlaza and Betancourt, 2018).
Project and problem-based learning	They point out that collaborative learning is key to solve problems and propose projects (Arteaga, 2019; Martínez et al., 2020; Sandoval, 2018; Valdivia, 2019).

As shown in Figure 10, of the total number of research studies linked to the pedagogical approach, 4 are related to proposing reflective, creative and critical activities, 2 to discussions, talks and workshops, and 4 to project and problem-based learning.

Figure 10
Number of studies on the Pedagogical approach by topic



Relevant variables

When analyzing criterion C7 of important variables, four variables are identified that lead the research topics oriented to project methods in the academic field of architecture, which are: the impact on the context and society, the activities and tools, the coherence in the process and the project specificity.

As shown in Table 8, an analysis was made of the linkage of each topic with respect to each variable identified.

Table 8

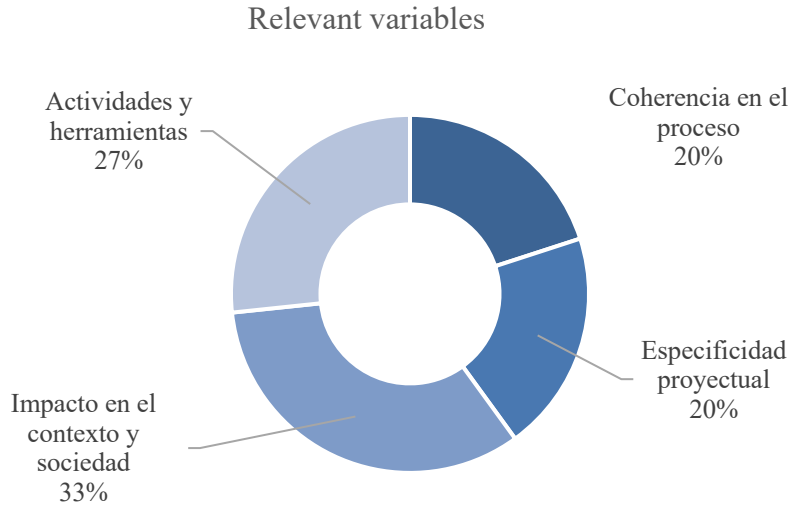
Relevant variables in studies on the subject

Themes	Consistency in the process	Project specificity	Impact on context and society	Activities and tools
Methodological Approach				
Identification of the problem			x	
User analysis		x		
Context study			x	
From general to specific	x			
Adequately provide the project		x		
Aspects: functional, spatial, formal and structural		x		
Analytical Approach				
Stages in design methods	x			
Social awareness			x	
Understanding the context			x	
Reflective Approach				
Project process and methodologies	x			
Commitment to society and the environment			x	
Digital skills and tools				x
Pedagogical Approach				
Reflective, creative and critical activities				x
Talks, lectures and workshops				x
Project and problem-based learning				x

An analysis was made to identify the percentages occupied by each topic in relation to the important variables identified. (see figure 11)

Figure 11

Percentage of topics per identified variable



It is obtained that 33% of the topics are linked to the Impact on the context and society, being these the most important, 27% to the Activities and tools in the project

process, 20% of the topics are linked to the Coherence in the process, while 20% to the project Specificity.

Discussion and conclusions

This article identifies that the highest output per year of research on the subject is in 2018, where an increase in interest in publishing on projective methods is seen. On the other hand, 77% of the studies are articles, while the countries with the highest number of publications are Argentina, Colombia and Peru. The methodology applied in these studies is predominantly qualitative, so it is understood that, in order to study the project method, it is necessary to describe and characterize the stages and activities that take place there, oriented to specificity.

Four major approaches were identified: Methodological, Analytical, Reflective and Pedagogical, being that the greatest interest falls on the first one. The importance of the Methodological approach is due to the interest and concern for the establishment of a structured guide or sequence of steps to develop architectural projects, since the frequent problem is the lack of coherence and logic in the development of projects.

The findings found in the studied research suggest that the most important topics oriented to project development methods for teaching in architecture are related to: problem identification, understanding and commitment to the context and society, and the stages, activities and tools in the project method. Finally, four relevant variables were identified and established that lead the project research topics, which are: Impact on the context and society, Activities and tools, Coherence in the process and project specificity. Of these, the first is the most important and of greatest concern in the research analyzed, being considered fundamental in the design process.

This study was limited to research in Spanish, the vast majority of which was from Latin America, so that future studies can take into account studies in other languages in order to have broader and more diverse samples. The relevance of the information presented in this article lies in the identification of data and variables closely related to the recurring themes in the research studies, which represents an important contribution and guide for future analytical or reflective studies as well as for future proposals of design methodologies for architectural education.

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IMPLEMENTATION OF AN INCLUSIVE MULTILEVEL MODEL FOR READING INSTRUCTION IN A BILINGUAL SYSTEM

IMPLEMENTACIÓN DE UN MODELO MULTINIVEL INCLUSIVO EN EL ÁREA DE LECTURA EN INGLÉS DENTRO DEL SISTEMA BILINGÜE

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ABSTRACT

This research analyzes the implementation of an inclusive multilevel model in bilingual education to teach English as a second language in elementary school. An Inclusive Educational Plan by its acronym in Spanish (PIE) was designed and validated based on the Ainscow and Booth Inclusion Index (2015), the Multi-Level Support System (MTSS) and the application of Universal Learning Design (ULD) principles. It studied the interrelationship of the inclusive multilevel model in the English reading class and the academic performance of students with and without some type of educational need. This study is structured as a quantitative, descriptive and comparative design between an experimental group and a control group. A total of 132 first grade students of elementary school from the Escuela Internacional Sampedrana and 20 students with Specific Educational Needs (SEN) participated. Data collection was carried out through specific academic reading tests in English and a satisfaction survey of the students of the experimental group. Among the most valuable findings, it stands out that all the students in the experimental group, with and without special needs, showed significant increase in the academic performance, and reading skills. The study validated the implementation of the inclusive multilevel model. In the survey, the students also showed high satisfaction with the type of methodology implemented to strengthen their learning of English as their second language.

Palabras clave:

RESUMEN

Esta investigación analiza la implementación de un modelo multinivel inclusivo para la enseñanza del inglés como segunda lengua en estudiantes de escuela primaria de educación bilingüe. Se

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NEAE, sistema multinivel de apoyo, Inglés, educación Inclusiva.	diseñó y se validó una propuesta de intervención educativa denominada Plan Integral Educativo (PIE) basado en el Index de Inclusión de Ainscow y Booth (2015), el Sistema de Soporte Multi Nivel (MTSS) y la aplicación de los principios del Diseño Universal del Aprendizaje (DUA). Se estudia la interrelación del modelo multinivel inclusivo en clase de lectura en inglés y el rendimiento académico de estudiantes sin y con una necesidad educativa. Es un diseño descriptivo y comparativo entre un grupo experimental y un grupo control. Participaron 132 estudiantes del primer grado de primaria de la Escuela Internacional Sampedrana de Honduras y 20 estudiantes con Necesidades Específicas de Apoyo Educativo (NEAE). La recolección de datos se realizó mediante pruebas académicas de lectura en inglés y una encuesta de satisfacción a los estudiantes del grupo experimental. Entre los hallazgos más valiosos se destaca que el estudiantado de grupo experimental, sin y con NEAE, mostraron un incremento significativo en el rendimiento académico de las diferentes capacidades implicadas en la lectura de inglés con la implementación del modelo multinivel inclusivo. En la encuesta los estudiantes mostraron además una alta satisfacción con el tipo de metodología implementada para afianzar su aprendizaje del segundo idioma.

Introduction

Diversity and multilingualism are two predominant characteristics in the social community and a latent reality in many international schools and educational centers in numerous countries. Bilingual education, with teaching programs in English and Spanish, has become a common option in many schools. The access of students with functional diversity to these programs is a controversial topic at the institutional and family level, full of myths and prejudices that requires in-depth studies to gather evidence of the results of these programs on a wide range of student abilities. Family aspirations of schooling sons and daughters with some type of Specific Educational Support Needs (hereinafter SEN) in bilingual systems are compromised as it is considered a very complex process, therefore, it is not an educational option for these students (Arregi, 1997). Bilingual schools attempt to respond to these needs by implementing different and multilevel educational models that enable neurodiverse students, whether mild, moderate or severe, to succeed educationally in these institutions.

The universal educational trend is to favor an inclusive and accessible quality education, a school where there are opportunities to optimize the individual potential of each person without limits to their participation. Achieving educational equity and overcoming all types of discrimination is the fourth Sustainable Development Goal and the European Agenda 2030 (UN, 2018), as well as one of the cooperation priorities of the Ibero-American Educational Organization (IBE-UNESCO, 2018). Attention to the diversity of students and groups at greater risk of exclusion requires an inclusive and multilingual quality educational response that is adjusted to the specific needs of each learner, to the cultural context of each country and to future socio-labor demands (Martín-Pastor and Durán, 2019). Inclusive education emphasizes the restructuring of spaces, resources and teaching practices to make learning physically and cognitively accessible to all students. The inclusive approach considers that the effort of schools should focus on offering learning opportunities for all and that differences should be considered a factor of enrichment to the educational process, not of exclusion. Consequently, the bilingual education system must have pedagogical innovation programs that facilitate the use of inclusive practices and curricular flexibilization (Fundación ONCE, 2017). The main international educational organizations (OEI, 2010; UN, 2018; IBE-UNESCO, 2018) support in the same sense, the need for inclusive and bilingual education to adjust to the demands of the 21st century, in which multilingual competencies must be acquired to function in a global society.

Literature review on the subject

The search for studies on the schooling of students with special needs in bilingual contexts carried out in the main databases (WOS, Scopus, Dialnet) indicates that these studies are very few in number. This would result in the need to deepen and investigate further the intersection of the two topics of interest of our research: inclusive education and bilingual education.

Authors such as Baker, 2011; Ainscow et al., 2013; Marchesi et al., 2014; Genesee and Fortune, 2014, defend the right of all students to an inclusive education in equity of opportunity. The results of this research highlight the need to restructure the organization and methodologies prevailing in regular schools to adjust to the collective and individual needs of each student. They demand education in normalized environments and greater educational support for these students. Students with permanent or transitory SEN are usually excluded from bilingual programs and do not

receive education in a second language, only in their native language (De Valenzuela et al., 2016; Fundación ONCE-Ilunion, 2017). This exclusion is argued on the learning limitations of neurodiverse students that affect their performance. The term neurodiverse cannot be understood as limitation or disability, according to Armstrong (2012), neurodiversity understands and explains that each brain may have different neural functions and behavioral traits that need diversity of ways to access learning. From this perspective, the difficulties cannot be explained only by differences in capabilities, but by the lack of adjustment of curricular programs and methodologies (Cooc, 2019). To effectively implement bilingual education, Bialystok (2016) points to curriculum flexibility to teach subjects with a gradual transition from the native language to the second language and over a period of several years. In this way, inclusive practices are opened up in accordance with the needs of the students and not with guidelines set by a rigid system of a pre-established bilingual curriculum.

For Castey (2020) it is essential to analyze the advantages of bilingualism from the early childhood stage, since "bilingualism develops cognitive potential from an early age" (p.5). The results of their studies clarify that bilingual students are able to develop cognitive skills that directly impact school performance. These facts would indicate that bilingualism helps to enhance cognitive skills and is not a problem that produces academic delays or interferes with other school abilities.

Despite the above, research conducted with SEN students in bilingual programs is scarce and its results are not conclusive given the variability of contexts and learning needs. Therefore, it is necessary to continue researching and deepening on the subject to find more solid evidence. Nevertheless, we highlight the positive trend of some factors identified as "good practices" for these experiences to be successful. Genesee (2014), De Valenzuela et al. (2016) and Cooc (2019), highlight the need to design inclusive learning spaces to favor bilingualism, evidence that students with some disability can achieve bilingual competence, within the limitations established by their difficulties, if the amount of exposure to each language is proportional and functional to their needs. Therefore, it is necessary to support both languages in their daily life, providing language support in both the first language (L1) and the second language (L2). Thordardottir (2010), has provided useful suggestions on how to support the learning of both languages in classes that are very heterogeneous in ability and motivation. Kay-Raining Bird et al., (2018) found that bilingual immersion programs with students with SEN have been beneficial and effective in L2 acquisition when using L2 as a communicative pathway.

The severity and characteristics of SEN may compromise overall academic performance and take longer to achieve effective communication processes in both L1 and L2. Some types of SEN affect cognitive and intellectual potential, and may take longer to acquire certain skills to learn to speak and write in two languages and may not fully develop in certain areas. Despite needing more time, according to Kay-Raining Bird (2018, p.2), "being bilingual does not hurt them in all other learning."

Martín-Pastor and Durán (2019), studied the implementation of bilingual programs from an inclusive perspective with the presence of students with SEN and how they receive supports. The results show that students with SEN drop out of bilingual programs in their transition to higher grades, as support strategies are more frequent and inclusive in the primary education stage than in secondary education. Another finding found is that students' difficulties are alleged as reasons to justify their exclusion, while school management issues and inclusive practices that provide access to education for all are ignored.

In Latin America, one of the biggest obstacles to implementing inclusive bilingual practices is the predominance of traditional teaching paradigms; rigid and conventional

curricula, expository methodologies and standardized learning processes with little or no adaptation to meet the specific needs of students (Marchesi et al., 2014).

Finally, we highlight a successful trend of bilingual learning with SEN students using the Universal Design for Learning (UDL) approach proposed by the Center for Applied Special Technology (CAST, 2011). The SAD is an inclusive global model that takes into account the diversity of the school population by minimizing physical, sensory, cognitive and cultural barriers in schools.

According to CAST (2011) the goal of SAD is to make use of a varied and flexible teaching methodology to eradicate barriers to quality education and effective learning. The DUA is considered a very useful model for bilingual students who are learning English as a second or third language. The SAD facilitates learning opportunities with three principles: I. Provide multiple means of representation (the what of learning); II: Provide multiple means of action and expression (the how of learning); III: Provide multiple forms of engagement (the why of learning).

Based on the conclusions of the review carried out, the hypothesis of the study arises: can students with SEN learn in a bilingual context if an inclusive multilevel model of student support is implemented? The objective of this research is to validate the functionality and effectiveness of a Comprehensive Educational Plan with the application of inclusive best practices for students with SEN within a bilingual education system with Spanish as the first language and English as the second language.

Method

The research adopts a descriptive experimental approach (Hernández et al., 2016) to analyze the implementation of a multilevel educational method designed specifically for this study, independent variable, in order to determine how it affects the performance and satisfaction (dependent variables) of those who participate in the study (experimental group) compared to the control group that has not participated in the implementation of the designed program. The study considered all members of the first grade school community: students, teachers, administrators and families.

For reasons of space, we only detail the results of the instruments applied to the students; specifically, we compare the quantitative data of the pre- and post-tests of reading achievement in English of first grade students in the control and experimental groups, including the results of neuro-diverse students in both conditions, to conclude with the data of the satisfaction survey of the experimental group.

Research objective and hypothesis

The objective is to analyze the effectiveness of an inclusive multilevel model implemented in a bilingual school with students with SEN and its impact on academic achievement in reading in English. The following research hypotheses were proposed: There is no difference in the average score of the post-test applied between the control and experimental groups (H0) and there is a difference in the average score of the post-test applied between the control and experimental groups (H1).

The procedures are based on the application of three academic tests that measure the level of individual growth of students in the control and experimental groups at the beginning and end of the study (pre- and post-test).

Study participants

A non-probabilistic, purposive sample was selected from the first grade of primary school at the Sampedrana International School in San Pedro Sula (Honduras), ages 6 to 8 years old. A total of 132 students participated, including 20 students with SEN, grouped in two situations, a control group (n=64 students) and an experimental group (n=68 students). In each group we found 10 neuro diverse students with similar characteristics in their educational support needs. For the formation of the two groups, the results of the pretest in the academic tests specified below were considered in order to form two groups with the most similar performance and educational needs possible. Three sections (64 students) were formed as control group and three sections (68 students) as experimental group, in each group there are 10 students with similar SEN. The profile of students with SEN is diverse, ranging from moderate to severe. The most frequent diagnoses are: Attention Deficit Disorder, emotional and behavioral disorders, cognitive limitations, autism spectrum disorders and situational crises.

Informed consent was obtained from participants and families according to the Declaration of Helsinki and the approval of the institution's Ethics Committee.

Study phases and timing

A search was conducted to support the theoretical framework and to select/arrange the necessary data collection instruments. In the second phase, the first quarter of the 2021-22 academic year, an analysis of the context and an initial diagnosis were carried out in order to develop the experimental design. In the third phase, the Multilevel Comprehensive Educational Plan (PIE) is designed and implemented with the contributions of the SAD and the support of the Multilevel Support System (MTSS). The fourth phase is developed in the 2nd and 3rd quarters to implement and evaluate the SIP. Finally, the test results are analyzed and the final report is generated.

Data collection instruments used

A variety of specific academic tests are used to determine participants' initial English reading level. The tests are validated by the Northwest Evaluation Association (NWEA) and adapted to the Honduran context by the Escuela Internacional Sampedrana (2022). The objective in the selection of tests is to provide a detailed analysis of all the elements involved in reading:

MAP (Measures of Academic Progress) is a standardized, summative online assessment test with digital devices (NWEA, 2020). The Northwest Evaluation Association (NWEA) website built and maintains the academic assessments for students in kindergarten through high school.

The Reading Control (Running Records) is a formative and individual reading test. It is recorded by means of a lettered level scale in alphabetical order where the lowest level is AA and the highest level is Z2.

The Phonics Screener involves phonetic categories designated in patterns in order of difficulty to encourage decoding of syllables by phonetic patterns. The following are analyzed: the name and sounds of the letters, words with 2 and 3 letters, words with digraphs, words with the silent letter e at the end, words with two vowels together, words with diphthongs, words with r syllables, compound words and finally the total mastery which is the sum of all the categories that is reflected in a percentage of final achievement.

The Sight Words Screener is a formative assessment that evaluates the automaticity of reading certain words in order of difficulty. The words are in sets of 215 words in each set, starting with the easiest to read to those multi-syllabic words that are complex to read.

Finally, a Likert-type survey with 5 gradients was applied to the students of the experimental group on satisfaction with the application of the multilevel program in English reading.

Data Analysis

The analysis compares the arithmetic means of academic test scores at the beginning and end of the program in the experimental and control groups.

Comprehensive Multilevel Educational Plan for bilingual education

The Comprehensive Educational Plan (PIE) is based on inclusion and educational equity with a multilevel model of support to improve in-class support for SEN in order to achieve reading expectations in the second language, English in the area of reading. The EIP is designed according to the Index for Inclusion (Ainscow and Booth, 2011) on three fundamental pillars: inclusive policies, practices and values.

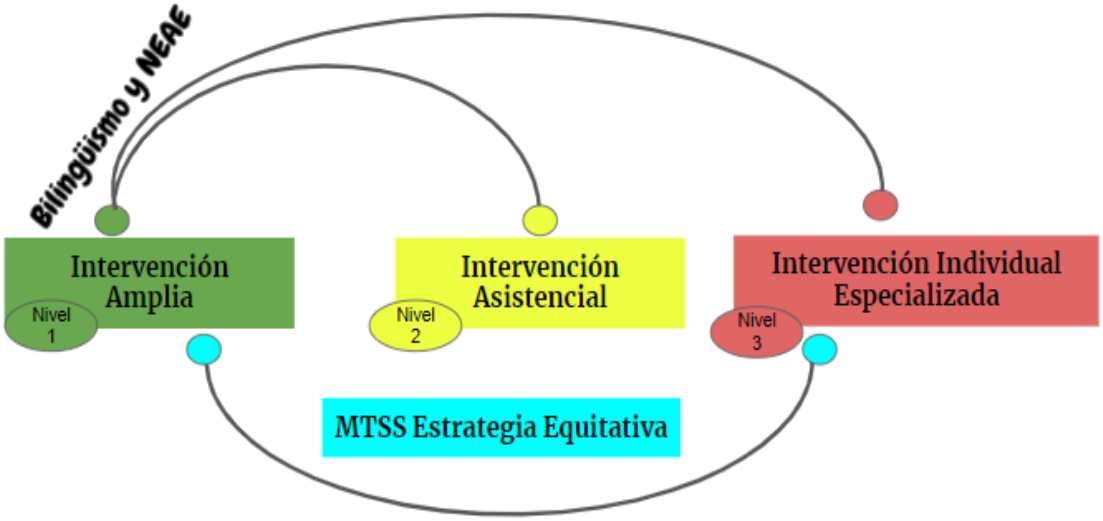
The PIE follows the Multi-Tiered System of Support (MTSS) model proposed by the Individuals with Disabilities Education Act (IDEA, 2018) as an inclusive strategy recognized in different educational contexts to address the latent needs of students with and without SEN. The MTSS according to Massengale et al. (2020, p.15), is a contemporary framework that allows schools to establish structures and practices to provide the entire community with the supports for school success and academic support.

The Project consists of three different levels of support for students depending on the adjustment to the proposed academic objectives and the implementation of the SAD:

- Level 1: aimed at the whole class with general support
- Level 2: support for small collaborative groups within the classroom
- Level 3: intensive small group or individual support in or out of the classroom.

Figure 1

PIE Student Support Model in Bilingual Teaching of Students with SEN based on Multilevel Structure



Tier 1- Extensive educational support intervention when needs are mild and can be met with group support within the classroom. These are non-significant curricular accommodations with a flexible curriculum and assessment.

Tier 2 - Welfare intervention, if needs are moderate and can be met in the classroom with small group/individual support using equitable teaching-learning strategies. Curricular accommodations can be non-significant with some significant modifications that directly impact the type of assessment, resources used and methodology implemented. Require an Individual Informal Accommodation Plan and/or specific counseling services.

Level 3- Specialized individual intervention when needs are significantly severe and their cognitive and academic potential is highly compromised. Requires intensive individual work to suit your needs in or out of class. Significant modifications directly impact the achievement objectives, the type of assessment, the resources used and the methodology implemented. At this level they require many curricular accommodations for second language acquisition. Students require an Individualized Education Plan, an Intervention Plan, a Behavior Plan and serious social/behavioral concerns that do not necessarily have a formal plan.

The PIE is based on studying the curricular content of the reading class in English as a second language (L2) in order to make that content more flexible according to the needs of the students and to implement differentiation practices in instruction. Basic, non-significant curricular accommodations are made that impact the use of varied resources and execution time in activities. The SAD is applied and in the most extreme cases, significant curricular modifications that impact the achievement of objectives, forms of evaluation and type of methodology are applied (CAST, 2011). In this way, meaningful learning is fostered in accordance with each student's scholastic potential.

PIE teaching methodologies for learning English as an L2

Lindamood-Bell's (2021) strategies for fluent and comprehensive reading were used. Lindamood-Bell is an educational company that promotes intensive and preventive didactic teaching programs for the entire school population and as a specialized intervention for students with moderate to severe SEN. Specifically, the Seeing Stars method was used, a structured English phonics program that reinforces the decodable part of the language. It relies on a multisensory approach, using the different senses to help students connect sounds, letters and words. Another method used is Visualizing & Verbalizing, which focuses on the power of visualizing dynamic images in the mind and verbalizing what they represent through enrichment of oral expression to describe illustrations, words, sentences and even paragraphs and entire complex content. Visualization of concepts is successfully stimulated (Lindamood-Bell, 2021, p.45). These strategies develop connections between concrete elements and abstract elements; it strengthens the capacity of comprehension between text and reasoning, giving meaning to the text and allowing them to access the information they have visualized and verbalized to use it when they need it.

All students in the experimental group received SAD implementation, differentiated reading instruction, small group reading by levels and simultaneous reading stations (individual reading, pair/trio reading, phonics practice, practice of frequently used words, ICT reading using the Reading A-Z platform).

Procedure used in the application of the Comprehensive Multilevel Inclusive Educational Plan

The implementation of the PIE in the experimental group was applied with the three levels of student support described above. This support involves the classroom teacher, the teaching assistant and the specific student support staff, known in our institution as the School Success Center. We detail the actions implemented for each level:

Actions at Level 1

A. Classroom instruction: the teaching staff assesses each student individually, respecting his or her profile of strengths and areas for improvement. Support needs are identified according to PIE levels 1, 2 and 3.
B. Utilization of inclusive active methodologies including 1st grade team planning sessions for collaboration, consultation, co-teaching with classroom profile meetings, modeling, coaching and resource sharing.
C. Application of Lindamood-Bell programs for the whole class in a general way.
D. Type of tasks for reading in English: implementation of reading instruction, guided reading, reading aloud, shared reading, reading-writing stations.

Actions at Level 2

A. Inclusive strategies and methodologies: the teaching staff applies inclusive strategies referenced by Acevedo et al (2020): learning by discovery, pedagogical contract, multilevel strategy, organization of content based on center of interest, group splitting, flexible groups, interactive groups, flexible organization of space, work in stations graduated by level of difficulty, shared teaching, peer tutoring, among others.
B. Intensive application of Lindamood-Bell programs: Seeing Stars and Visualizing /Verbalizing with in-classroom reinforcement by small group teaching assistants for students who show difficulty in their reading fluency is done in learning corners two or three times a week for 20-30 minutes.
C. Type of tasks for reading in English: reading groups by homogeneous levels to specifically reinforce phonics, reading fluency, vocabulary or comprehension.

Actions at Level 3

Individual Monitoring: individual goals are set for reading skills with individual follow-up and monitoring. Design of individual plans: IEP, IP, Informal Accommodations, Behavior Plan.

Classroom accommodations/modifications: classroom teachers and teaching assistants provide significant accommodations and modifications. Individual plan design is reviewed, monitored and followed up. Differentiation is made in instruction considering the significant elements of the curriculum (objectives, activities parallel to the expected curriculum, evaluation of expectations and achievements).

Inclusive strategies: individualized instruction inside and/or outside the classroom by student support staff, co-teaching within the classroom.

English reading: intensive paired or individual instruction for students identified with SEN using Lindamood Bell programs.

Reinforcement class in reading by the student support staff: intensive individual or small group reinforcement for students with a severe level of difficulty.

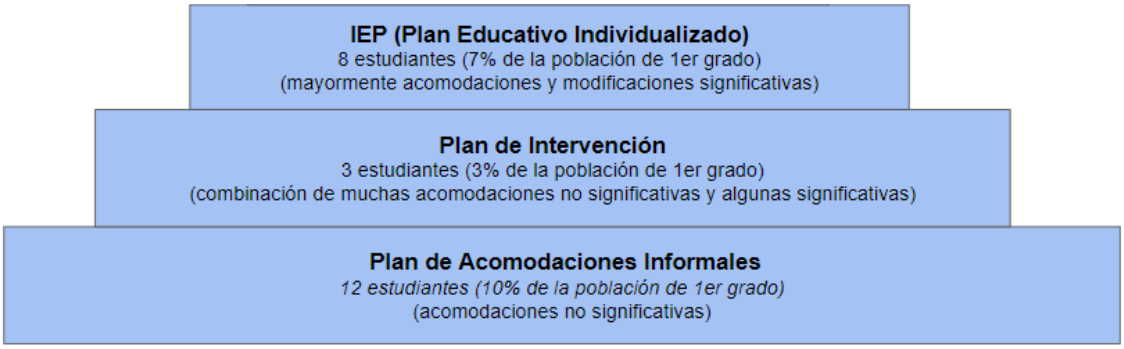
Results

Shown on this ladder are the results of the different types of individual plans for students already identified with a diagnosis requiring student support.

Among the plans are: the Informal Accommodations Plan, non-significant accommodations to the curriculum. The Intervention Plan provides for a combination of many non-significant accommodations and some significant accommodations according to the type of need. And the Individualized Education Plan (IEP), where most accommodations and significant modifications are made to the academic curriculum.

Figure 2

Laddering of Individual Plans and type of student support



The Informal Accommodations plan is the predominant support in 1st grade with 12 students which equals 10% of the total 1st grade population. Secondly, the IEP plan where significant curriculum accommodations are written with 8 students representing 7% of the total 1st grade population. Third, the Intervention Plan, which is a mix of a few significant and mostly non-significant accommodations with 3 students representing 3% of all 1st grade students.

There is a percentage of academic plans with 23 students, equivalent to a percentage of 18%. Of the total of 132 students in the study, 109 (82%) do not require any type of individual plan, although 40 of them require Level 1 support with some basic adaptations in order to guarantee the achievement of the objectives of the bilingual program for 1st grade.

Initial and final assessment results on the MAP (Reading Measures of Academic Progress/Test de lectura en inglés) test

The MAP tests are located on the NWEA website (NWEA, 2020) which measures the results through the RIT (Rasch Unit). The RIT is based on a scale to measure and compare the academic performance and growth of a student, a class, a grade level, or an entire school or school district. The RIT scale spans all grades, allowing a student's score to be compared at various points throughout his or her education. Percentile rank measures in ranges from 0 to 99 are used to group test scores into ranges: At Risk rank (0% to 15%), Low rank (16% to 20%), Low Average rank (21% to 40%), Average rank (41% to 60%), High Average rank (61% to 80%), and High Rank proportions (81% to 99%).

Table 1

2020 MAP Achievement Standards English Reading Test

Grade	Beginning of the Year	New Year's Eve
	RIT - Average	RIT - Average
Kinder	136.65	153.09
1	155.93	171.40
2	172.35	185.57
3	186.62	197.12

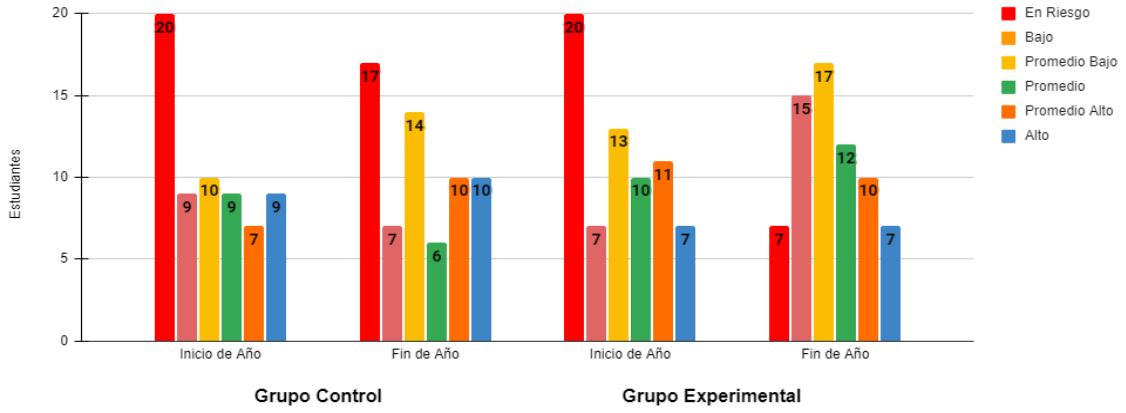
Rangos Percentiles
Rango En Riesgo Percentil: %ile <15
Rango Bajo Percentil: %ile 16-20
Rango Promedio Bajo Percentil: %ile 21 -40
Rango Promedio Percentil: %ile 41 -60
Rango Promedio Alto Percentil: %ile 61 -80
Rango Alto Percentil: %ile 81-99

Note. Source: NWEA Regulation 2020

Below, we show the number of students located in each of the described levels-ranges comparing the control and experimental groups before applying the Program and at the end of its implementation.

Figure 3

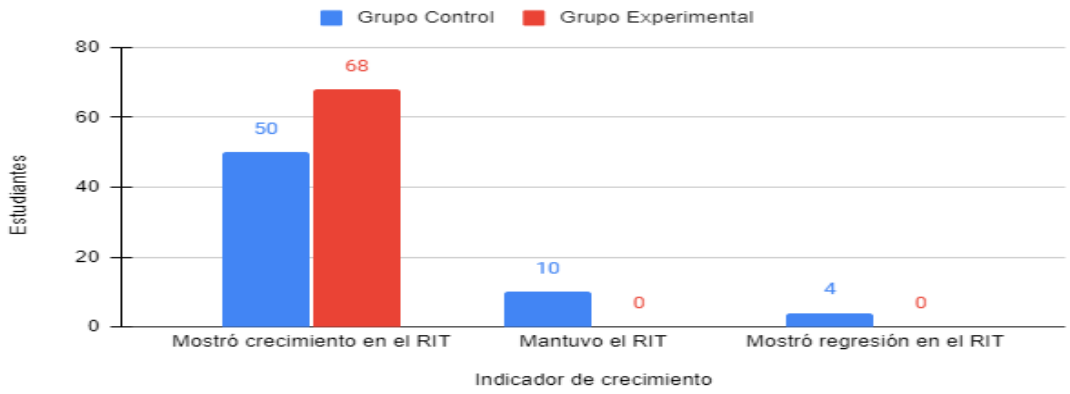
Comparison of percentile ranks of MAP English Reading Test at the beginning and end of the test. Control vs Experimental Group of all Students without and with SEN



The experimental group increased its performance level by decreasing students in the Risk and Low ranges. The vast majority of students in both groups increased their performance level comparing the beginning and the end of the year. Emphasis is placed on the comparative analysis of the control vs. experimental group since, at the end of the course, only 7 students in the experimental group were in the risk range, as opposed to the control group, which shows 17 students still in the risk range. In the 1% range, 5 students in the control group and no students in the experimental group, alluding to a positive and significant evolution of achievement. In total, 13 students moved from the risk range to the low range, showing significant growth, unlike the control group, where only 3 students moved from the risk range to the low range.

Figure 4

Comparison in English Reading Test, control group vs. experimental group



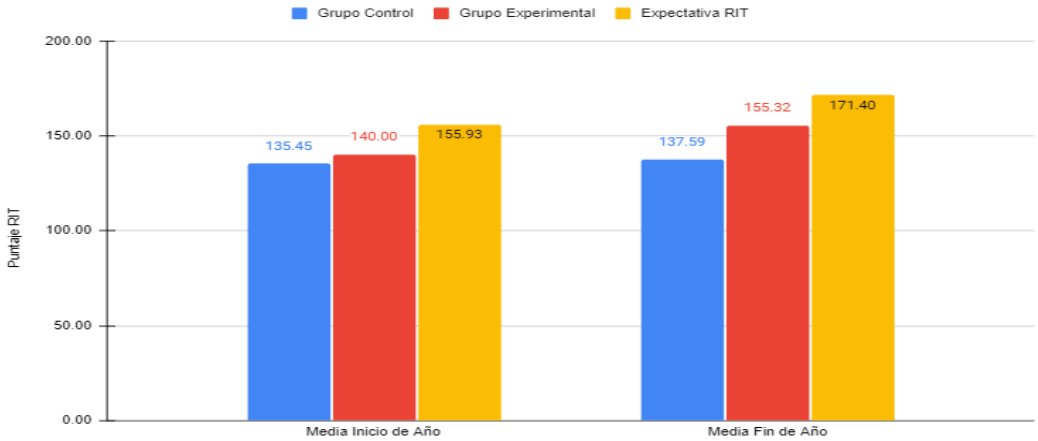
In the control group, 50 of 64 students, with and without SEN, showed growth in the MAP English Reading Test RIT score, 10 students obtained the same score at the beginning and end of the year, and 4 students showed regression in their score.

In the experimental group, all 68 students with and without SEN showed growth in the MAP English Reading Test RIT score; no student remained at the same score or showed regression.

In general, the experimental group shows an improvement in the number of students who improve their reading skills. Also evident is the individual growth of the students in the experimental group as they received individualized and small group support within the MTSS level 2 and level 3 scheme to increase their English reading skills.

Figure 5

Comparison Arithmetic Mean of RIT MAP Reading between control and experimental group



The figure above shows the comparison of the mean scores before and after the start of the program in the control group, experimental and RIT expectations, represented in the yellow column (for first grade students at the beginning of the course it is 155.93 and for the end 171.40).

In the NEAE experimental group they have higher growth (arithmetic mean of 155.32) although they fail to reach the RIT expectation of 171.40.

Figure 6

Reading Control Test Expectations (Running Records) from 1st to 3rd Grade

	Inicio de Año	Fin de Año
1er Grado	B+	I+
	A	H
	AA	Debajo de G
2do Grado	I+	M+
	H	L
	Debajo de G	Debajo de K
3er Grado	M+	R+
	L	Q
	Debajo de K	Debajo de P

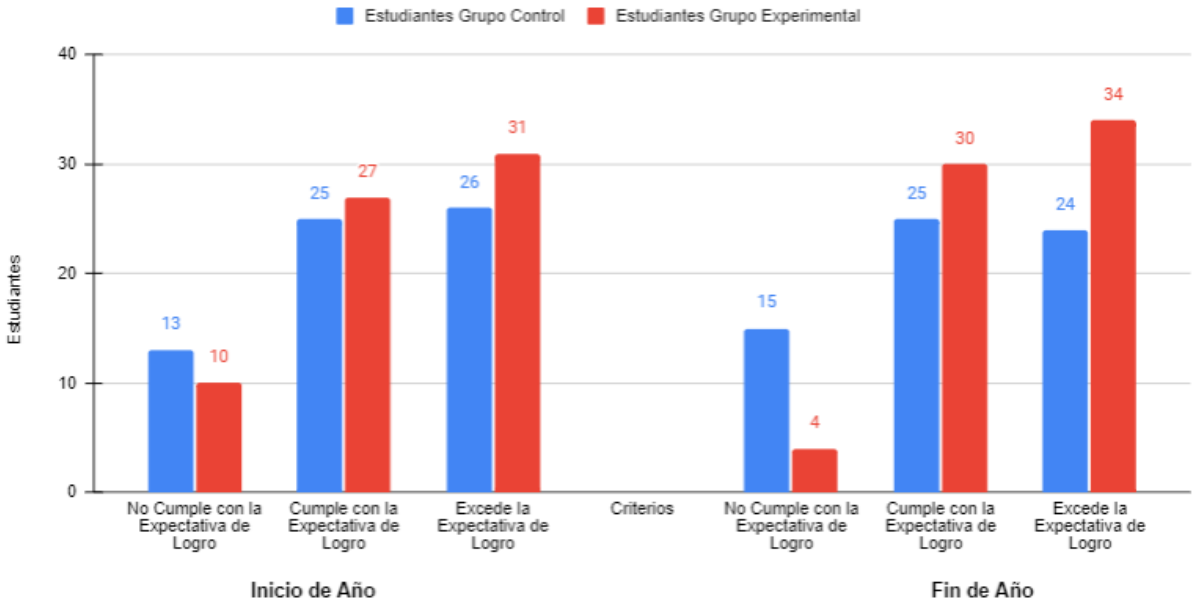
Codigo:	
	Excede la Expectativa de Logro
	Cumple con la Expectativa de Logro
	No Cumple con la Expectativa de Logro

Note, Adapted from (Learning a-z, 2020)

The Reading Control test, Running Records, represents reading levels on an alphabetical scale from AA to Z where "AA" is the lowest level and "Z" is the highest.

Figure 7

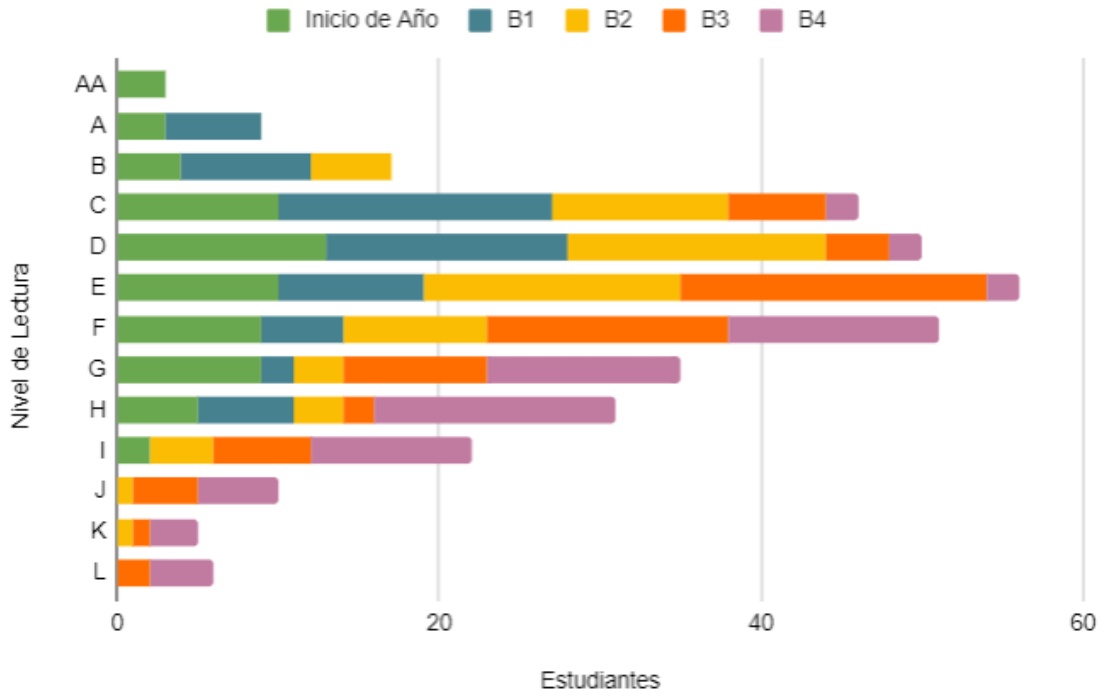
Comparison of number of students in the control vs experimental group of the English reading test



At the end of the course, the number of students in the experimental group that exceeds the achievement expectation increases while the number of students in the control group decreases slightly and the number of students who do not meet the achievement expectation at the end of the course decreases.

Figure 8

Number of Students in the Experimental Group without and with SEN according to Reading Levels in each of the four bimesters of the school year



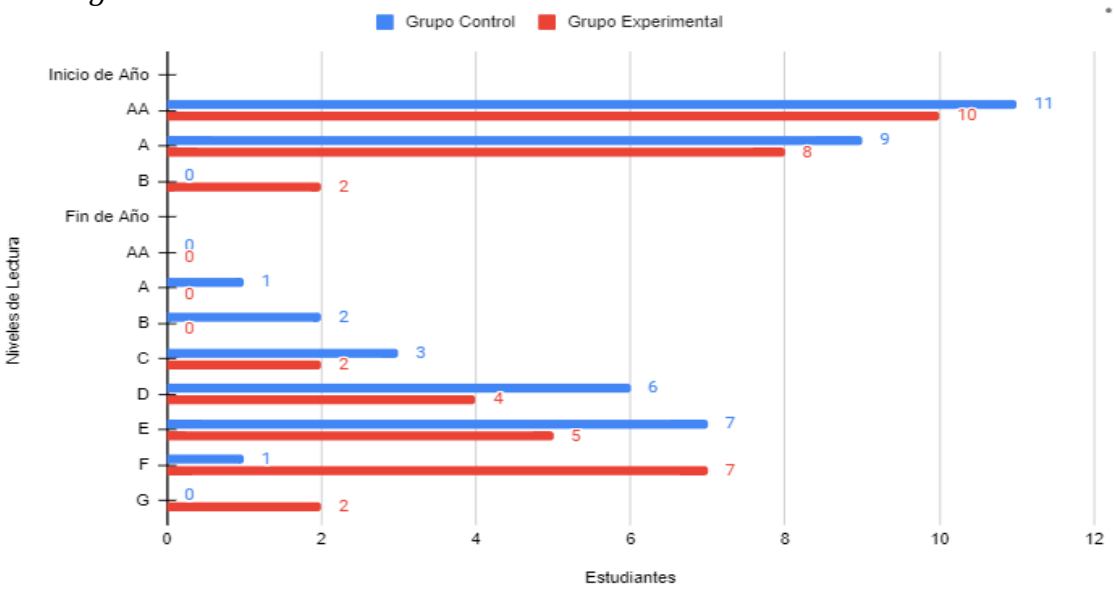
Note. The following codes are used: B1- 1st Bimester, B2- 2nd Bimester, B3 - 3rd Bimester, B4- 4th Bimester. The levels are taken from (Learning A-A, 2020) using a system of levels based on alphabetical letters where AA is the lowest and ZZ the highest

The experimental group received English reading intervention at Level 3 with individualized support inside the classroom by teaching staff; support outside the classroom was provided three times per week for 25 minutes. Those students in Level 2, close to the achievement expectation, had small group English reading support in the classroom by teaching staff three times per week for 15 minutes.

The implementation of the PIE with intensive small group and individual intervention in Tier 3 reflects a marked increase in reading and comprehension levels in English. The students identified with SEN showed higher school performance, obtaining a greater number of students in the expected normative standard. Certain students reflect accelerated growth of up to 3 levels in one period.

Figure 9

Comparison of number of students with SEN in the control vs. experimental group in the English reading test



We observed progress in reading in both groups, with the growth of the experimental group standing out in the final test. Although no student identified with SEN in both groups reaches the achievement expectation, in the experimental group most students are closer to reaching the ultimate goal.

In the experimental group, 68 students benefited from the intervention according to the multilevel structure, students with a SEN received support at level 2 and 3 to accelerate their L2 learning. Progress was observed in both groups, growing according to the expected levels. The implementation of the SIP demonstrated greater effectiveness with the intensive intervention at level 3, which is the most vulnerable population.

Table 3

Comparison of control vs. experimental group in the percentage of mastery of the English phonics test (Phonics Screener) at the beginning and end of the course

	Phonetic Patterns Percentage										
	Letter Names	Sound of Letters	2 letter words	Words of 3 after	Digraph Words	Words e at the end	Words 2 vowels together	Diphthong words	Words with syllable r	Words Compound syllables	Total Domain
Expectation of Achievement	26	26	13	5	5	5	5	5	5	5	100%
Control Group Home	5	4	2	1	0	0	0	0	0	0	12%
Experimental Group Start	6	4	2	1	0	0	0	0	0	0	13%
Final Control Group	18	16	7	3	3	3	3	2	2	3	60%
Final Experimental Group	26	23	13	5	5	4	4	4	5	5	94%

In the control group, the results of mastery of phonetic patterns show an important

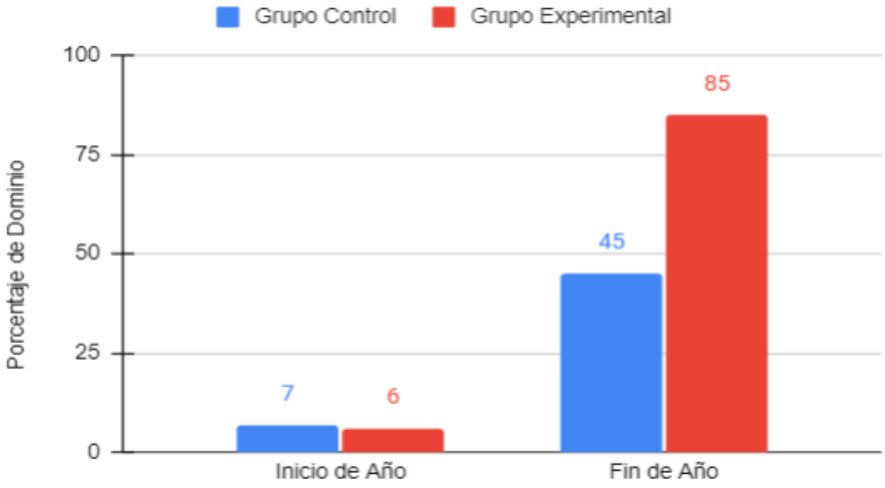
growth comparing the initial and final performance of all students; at the beginning, the arithmetic mean is 12% in the risk range. At the end of the year, 60% of the total is in the average range.

In the experimental group, at the beginning of the course, 13% of the students were in the at-risk range. At the end of the school year, the percentage of mastery is 94%, which indicates the achievement of the planned objectives.

In the experimental group, the phonetic pattern with the lowest dominance is diphthongs and those with the highest dominance are 3-letter words. Differences are shown between the acquisition of the other phonetic patterns showing greater growth in the experimental group.

Figure 10

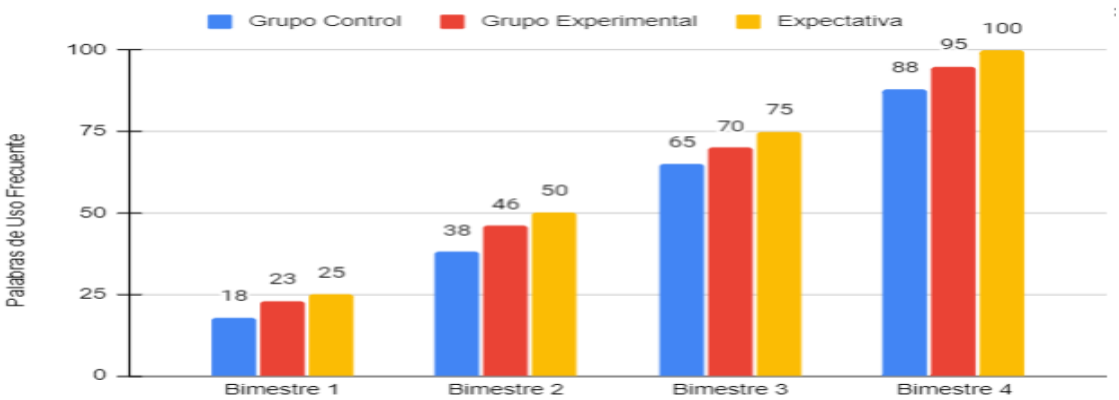
Comparison of the percentage of mastery of the phonics test at the beginning and end of the course in the control group vs. the experimental group exclusively with students with SEN



The results of the initial evaluation show fairly similar average scores in both groups. On the contrary, the results after applying the PIE show a great advantage of the group of students with SEN of the control group over the experimental group in the mastery of phonetic patterns.

Figure 11

Comparison at percentage of mastery with automaticity of the frequently used words test (Sight Words) control vs experimental group

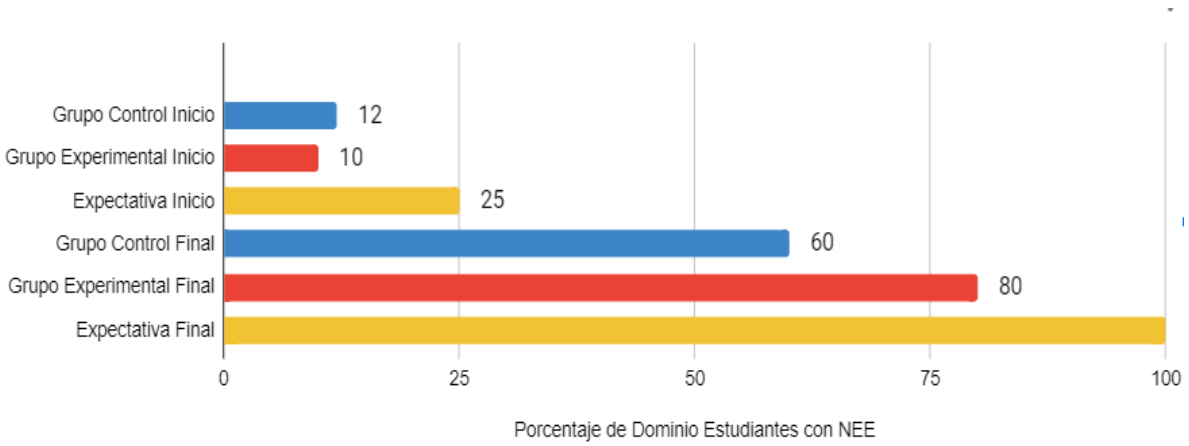


The results show greater growth in the academic performance of students in the experimental group over the control group throughout all the bimesters of the course. In the 1st bimester the control group scored 15 and 23 the experimental group, with an expectation of automatic reading proficiency of 25 words. At the end of the last bimester the control group demonstrated an arithmetic mean proficiency of 60 words, the experimental group of 23 when the expectation of automatic reading proficiency was 25 words.

The results show greater growth in the experimental group than in the control group on the Frequently Used Words test. The control group achieved 88% mastery of frequently used words while the experimental group achieved 95% mastery of these words.

Figure 12

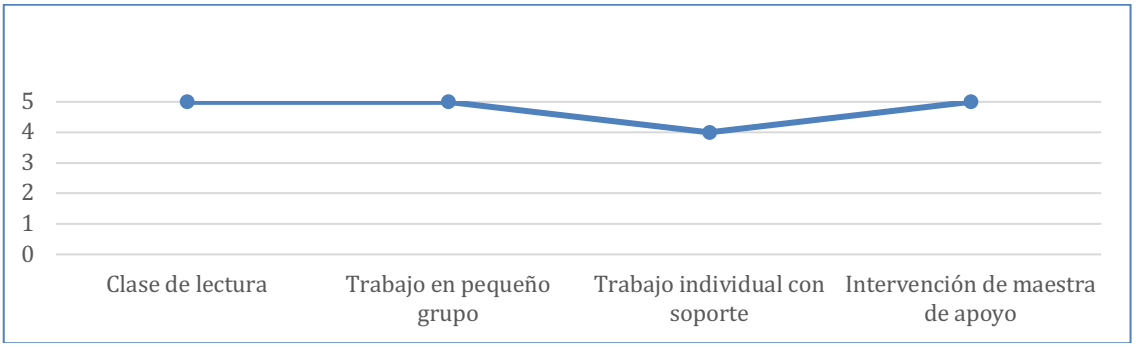
Percentage of mastery of the frequently used words test students with SEN control vs experimental group



Again, the results show a higher growth in the experimental group (80%) of students with SEN than in the control group (60%) on the Frequently Used Words test. Although no student with SEN in either the control or experimental group reached the expected reading expectation of 100 words for 1st grade, students in the experimental group came closer to it.

Figure 13

Arithmetic mean of the degree of satisfaction of the experimental group as a function of the grouping used



In addition to the better performance obtained in all tests by all students in the experimental group, the results of the survey also show a high level of satisfaction on the part of these students in the different groupings used, as can be seen in the figure above. In three of the learning situations assessed, the maximum score was obtained on average (5/5 in 100%). Only the "individual work with support" obtained a slightly lower average (4/5). In the observations section of the survey, the comments that stand out most in terms of changing attitudes and values are: "I respect other people's differences", "we are all smart in different ways", "we are all different, we are all special", "we are all good at something". On the academic side, we highlight the comments from students with SEN: "I learned a lot in these classes", "I finally learned to read," "now I know a lot of star words and I read a lot of books", "now I like to read", "now I can read, I learned to read more, to be better at school so I can read things I didn't know before", "I learned to read faster, know more words and speak English", "now I read very fast and I don't make up words", "now I read a lot and I feel good", "I came from another school where they didn't read English, now I speak a lot, I understand English and I love it" (Escuela Internacional Sampedrana, 2022).

Discussion and conclusions

In the review of articles similar to the topic of study, very little directly related research has been found to be contrasted. Among the references reviewed, we highlight the work of De Valenzuela et al. (2016), with the aim of showing evidence of L2 learning in students with some disability. This study also shows that students with some type of SEN were able to learn to read and comprehend in English as their second language. It was necessary, as in our study, to create the ideal learning conditions for their achievement: respecting their learning pace, internalization time and implementing curricular accommodations adjusted to their needs. The results of the study by Martín-Pastor and Durán (2019), along the same lines, indicate that support strategies and inclusive practices provide second language learning opportunities at the primary education stage for students with SEN. This study applies an inclusive multilevel model with neurodiverse students who are able to learn to decode English phonetic patterns, read short paragraphs, and express themselves verbally in English with comprehension on narratives at their level. In our study, we can conclude that the implementation of the PIE favors the academic performance analyzed in reading in English of students without and with SEN, in all the tests performed the results of the experimental group are superior to the control group. The experience proved satisfactory for those participants who received level 2 and 3 support to reinforce reading and English skills. The 22 students with SEN rated the classes received with 95% satisfaction.

The structure of the implemented SIP, in line with MTSS models (Massengale et al., 2020), provide a framework that allows schools to provide the supports they need to be successful in school and provide academic support. Our study verifies that multilevel curriculum design is effective for bilingual learning including students with SEN. The multilevel structure made it possible to provide reading support in English to students who show significant difficulty in acquiring the second language with optimal results.

The application of SAD in multilevel activities (Acevedo et al., 2020) provided opportunities to access content with varied auditory, visual and tactile modalities that increased comprehension and learning with the support of digital resources. Our results show that inclusive practices benefit all students, both AcNEAE and those considered normal. The experience gained has provided detailed short-term guidelines to be more

effective in individualized supports, coordination with school staff and the need to schedule a work plan with families of students with SEN. As a future line of research, we plan to: adjust work protocols, reach a consensus on the decisions of the school support department regarding services, number of students and case management; triangulate data and results in each school semester; establish collaborations with other departments involved and, in the medium term, make adaptive replications of the PIE in other primary grades and extend the experience to similar organizations.

Despite the achievements, we found some limitations, the Coronavirus pandemic left sequelae in face-to-face learning even in the 2021-2022 school year. Some families for health and safety reasons remained in the virtual system resulting in a hybrid learning modality. This modality represented an enormous educational challenge for the teaching staff and a limitation for the students. The virtual modality lowered the levels of motivation, the disposition towards learning and the opportunity to participate in the different activities planned in real interaction among peers.

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THE INFLUENCE OF THE GENDER VARIABLE ON CHILEAN EFL PRIMARY STUDENTS' LEXICAL AVAILABILITY

LA INFLUENCIA DE LA VARIABLE GÉNERO EN LA DISPONIBILIDAD LÉXICA DE ESTUDIANTES CHILENOS DE PRIMARIA

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ABSTRACT

Lexical knowledge of language learners is a priority when thinking of teaching a foreign language successfully, and lexical availability tasks appear to be an effective tool for teachers to obtain evidence of vocabulary acquisition. This study seeks to determine the incidence of the variable gender on the L2 available lexicon of primary students. The research was conducted with a sample of 99 fifth-grade students in a subsidized school in San Pedro de la Paz, Chile, 52 males, and 47 females. A quantitative methodology was used with a non-experimental design, where data was gathered through a lexical availability test with five centers of interest from a non-probability sample. Findings indicate that gender is a variable that does not affect the available lexicon of primary students. This research will serve as a base for future studies on different variables that can affect primary students' lexical availability, to improve language teaching practices.

Palabras clave:
disponibilidad léxica, género, centros de interés, inglés como lengua extranjera.

RESUMEN

El conocimiento del léxico de estudiantes de un idioma es prioridad cuando se piensa en enseñar de manera exitosa una lengua extranjera, y las pruebas de disponibilidad léxica aparecen como una herramienta efectiva para profesores para obtener evidencia de la adquisición de vocabulario. Este estudio busca determinar la incidencia de la variable género en el léxico disponible de una lengua extranjera de estudiantes de educación primaria. La investigación fue conducida con una muestra de 99 estudiantes de quinto grado de un colegio particular subvencionado en San Pedro de la Paz, Chile, 52 varones y 47 damas. Una metodología cuantitativa fue usada con un diseño no-experimental, donde los datos fueron recogidos a través de una prueba de disponibilidad léxica con cinco centros de interés de una muestra no-probabilística. Resultados indican que el género es una variable que no afecta el léxico disponible de estudiantes de enseñanza básica. Este estudio sirve como base para

	futuros estudios en distintas variables que pueden afectar la disponibilidad léxica de estudiantes de educación primaria, para así poder mejorar las prácticas de enseñanza de un idioma.

Introduction

A primary concern of English Language Teaching as a second language nowadays, generally accepted by recent research according to Herreros (2015), is that lexicon is a fundamental factor in the process of teaching-learning a foreign language. She states that there is a change of perspective that goes from considering lexicon as a secondary element in the learning of a language; to revaluing and integrating it as a primary element. The lexicon is a key aspect that makes sense to the linguistic system, considering that without the lexical learning of a language, effective communication in different situations cannot exist (Palapanidi, 2012).

Cepeda, Granada, and Pomes (2013) state that lexical development in children is a complex and progressive process where different intrinsic and extrinsic factors influence the process of vocabulary acquisition. In this context, Porporato (2014) claims that any human being has a mental lexicon that varies according to different factors such as age, gender, social class, and education. Jiménez and Ojeda (2009) also sustain that in the context of the foreign language classroom other variables, such as age, grade, type of instruction, the kind of language test given to students, and gender may influence the learning process, interfering in their outcomes in the foreign language.

Regarding gender, Agustín and Terrazas (2012) state that many studies have reported that this variable is an important aspect affecting several areas of second language acquisition, such as reading comprehension, listening comprehension, writing, speaking, vocabulary acquisition, or learning strategies. These authors also claim there are contradictory findings within research on language acquisition considering gender's effect: some of them (Jiménez, 2003; Van der Slik, Van Hout & Schepens, 2015, Galdames, Guerrero & Toledo, 2018; Calero & Serrano, 2019; Abibi, 2021) confirm the superiority of females above males, while others (Edelenbos & Vinjé, 2000; Lin & Wu, 2003) show the superiority of males, as well as others (Jiménez & Terrazas, 2005-2008; Rudzinska, 2013, De la Maya Retamar & López-Perez, 2020; Quintanilla & Kloss, 2020) that sustain there are no major differences in language acquisition regarding gender. Jiménez and Ojeda (2009) suggest that there are no permanent differences between male and female students and that there are gender tendencies that may emerge in some language learning contexts because of the interrelation of individual and instructional variables. Within the process of vocabulary acquisition, Cepeda, et al. (2013) sustain that there are some observable differences between males and females because the social context is a factor that influences the way children acquire and use the language such as their parents, school, peers, sociocultural practices, or even biological differences.

Grammar is a major area of interest within the field of the teaching of English as a second language. According to González (2014), in any curriculum design of a foreign language teaching program, the grammatical contents are carefully planned and supported by enough research that analyzes how and when to teach the different syntactic structures. However, this author sustains that the same does not happen with the lexicon, where its selection has been left to the teacher's intuition or the text authors without an objective criterion. Hence, Cepeda, et al. (2013) state that it is necessary to count with mechanisms that allow us to know the available words required for people in different contexts because lexical knowledge is a basic linguistic competence for the learning process of a language and for the communicative process.

The aim of this study is to shine new light on these debates of the available lexicon and the individual differences that may influence their learning process. A primary concern in this research is to investigate the incidence of the gender variable through the

examination of the lexical availability of students of primary education. As a result, the following research questions arise:

1. How many words do female and male primary students at a subsidized school produce on average in a lexical availability task?

2. Are there any differences in the type of words produced in a lexical availability task by female and male primary students at a subsidized school?

Lexical Availability

The concept of lexical availability was born in 1951 when the French Ministry of Education established a special committee to build up the lexicon that would best accomplish the requirements of students of French as a foreign language, the most suitable words needed to communicate in the language based on the criteria of word appearance frequency (Ávila, 2017). It was decided that the focus should be given to the most frequent words because they were the most useful words to be included at an elementary level in a language teaching program (Payne, 2016). However, López (1995) suggests that the list of words that came out from a frequency analysis reflected an absence of the familiar and most common words used in a language; therefore, this methodology was not good enough to cover the fundamental or basic lexicon of a language, because the words that appeared on these lists were mostly grammatical rather than semantic. As an attempt to solve this problem, Bartol (2006) states that the concept of lexical availability appears as an option for researching the available lexicon of a language. He declares that the available lexicon is a new approach to the study of the lexicon, as it considers the words that are organized in our mental lexicon that are ready to be used or available when a certain communicative situation requires it beyond a specific stimulus. At the beginning of lexical availability, Michėa (1953) states that the available lexicon is characterized because it comes up in the speakers´ mind in an immediate and natural way when dealing with a specific topic. It is a word that is not necessarily frequent, but potentially lives in the speaker and it is updated when associations are produced.

From the perspective presented, the frequency words, which include mostly grammatical words, are complemented with specific thematic words, aimed to address certain themes in daily life. Lexical availability, therefore, provides the vocabulary that native speakers would potentially use in connection with a certain topic; consequently, this is the vocabulary that foreign speakers should also know and must be included in explicit EFL teaching, regardless of their position in frequency lists (Šifrar, 2014).

For elaborating the available lexicon, data is gathered from controlled associative tests, which are an artificial technique to get words to come up to the surface through written or oral lists, as responses to a specific stimulus, produced by certain speakers.

Centers of Interest

The available lexicon obtained by the lexical availability tasks is grouped in notional fields, which in lexical availability are called centers of interest, which are very similar to the topics and subtopics developed by the domains considered in the Common European Framework of Reference for Languages (CEFR) (Bartol, 2006).

Most research regarding lexical availability has used these centers of interest, sometimes not all of them. They are thematic stimuli relatively wide, aiming to cause the lexical answers of the individuals interviewed, which are the same for all the individuals. The methodology applied in lexical availability studies follows the proposal of the PanHispanic project, which includes 16 centers of interest that serve as a stimulus to activate the mental lexicon of the participants to produce in a written task an opened list of the available lexicon in two minutes for each center of interest (Mena, 1986). With these

results, some social factors are examined depending on the objective of the study, to finally make a homogenization from the data and get the lexical availability index of each word from computing software (Palapanidi, 2012).

Lexical Availability Index

Researchers committed to studying lexical variation based on lexical availability have developed mathematic formulas to obtain the lexical availability index (LAI). López and Strassburger (1987) proposed a formula to obtain lists of words consistent with the lexical available indexes. The formula intended to have the dispersion factor to be systematic, without considering a fixed number of words for each center of interest, which was one of the inconsistencies of the previous formulas proposed by other authors (López & Pérez, 2014). The formula is based on:

a. The absolute frequency where the word was produced in every position.

b. The absolute frequency of the word, that comes up from the addition of the different frequencies in each position.

c. The number of participants.

d. The number of positions obtained in the task in the center of interest.

e. The position in which the word was produced.

Figure 1

Lexical availability formula

$$D(P_j) = \sum_{i=1}^{n} \left(\frac{f_{ij}}{I} \right) e^{-2.3 \left(\frac{i-1}{n-1} \right)}$$

Where:

D (Pj) = availability of the word j.

n = highest position in the center of interest.

I = position number.

j = index of the word.

e = natural number (2.718181818459045).

fij = absolute frequency of the word j in the position i.

i = number of participants.

The measurement of lexical availability by an index allows researchers to analyze each word beyond its frequency of appearance, also considering its position and number of participants in the study. The results obtained must be between 0 and 1, where 1 is the highest availability and 0 is the lowest (Garzón & Penagos, 2016).

Empirical Studies on Lexical Availability and Gender in Second Language (L2)

There are a few studies on lexical availability considering the effect of gender in the field of second language acquisition, compared with other factors that affect vocabulary acquisition such as age or language learning strategies. This section offers a detailed description of studies addressing the gender component in L2 (English and Spanish) lexical availability.

First, a study carried out by Agustín-Llach and Fernández (2014) took a sample of 190 EFL students and measured their lexical availability at two points of time, when they

were 12 years old and when they were 15 years old. They wanted to find out if there was an effect of gender on their available lexicon over time. Data collected showed that females outperformed males in all the prompts of the lexical availability task when they were 12 years old, a difference that remained three years later. In six out of nine of the prompts included in the lexical availability task applied to the students at both points of time, females had a better performance than males with a significant difference on both results, and both males and females increased their vocabulary over time.

Another study aiming to identify gender-based differences of EFL learners in their lexical availability that revealed a statistically significant female advantage was conducted by Fernández (2010). This study pointed out the possible effect of gender and motivation on the vocabulary production of 250 EFL second grade secondary school students in Spain. The results of the lexical availability test that included six cue words in English showed that the 139 females outperformed the 111 males of the sample.

Furthermore, Jiménez and Ojeda (2009), in their study on girls' and boys' lexical availability in EFL, claimed that girls achieved higher results on their available lexicon in each of the 15 cue words included in the lexical availability task. The research was conducted with 210 female and male learners of Spanish in primary education and provided evidence of the higher lexical productivity of female students. The results concluded there was a difference between the number of words produced by girls and boys, and that it was more relevant for some cue words than others, but in general, the pattern of girls' over-performance was consistent for all the cue words of the lexical availability task.

Another study in EFL learners conducted by Quintanilla and Kloss (2020) investigated the influence of gender on lexical availability among 46 fifth graders. The study focused on analyzing the impact of gender on lexical availability in the centers colors, family members, sports, animals, and food and drink. The results from the associativity test revealed that both male and female students had diverse lexicons, but the gender variable did not significantly affect the quantitative or qualitative aspect of lexical availability.

Regarding studies that examined Spanish as L2 and the gender effect on lexical availability within the Spanish proficiency level, Verdeses-Mirabal (2012) showed the lexical availability of Hispanic students of Redwood City in California. Findings that emerged from a given sample of 518 students of twelfth grade in high school, 245 male and 273 female students, showed that females provided more responses in each of the prompts of the lexical availability test, and they were statistically significant. This study showed the gender variable as the factor that has a major incidence in all the prompts, more than other factors such as the L1, the regular language used, the Spanish proficiency level, the immigrant generation, and the sociocultural level.

In addition, a study conducted by Sandu (2012) highlighted the gender effect on Spanish as L2 lexical availability and its correlation of gender with the students' scholar level. With a sample of 280 students, where 76 of them were 18 years old, 101 were 15 years old, and 103 were 12 years old, where 204 were females and 76 were males, he confirmed a clear quantitative superiority of females above males in all the 16 semantic fields included in the lexical availability test, a difference that was statistically significant. Also, the most frequent words that appeared in the results provided by the test were similar between females and males, but the order of appearance in the lists (LAI) was different. Considering the different scholar levels, the superiority of females was maintained, but the difference that increased through the years among the available lexicon from females and males was more qualitative.

Yet, despite findings females show higher performance on lexical availability than males, and this makes the quantitative difference less relevant than the qualitative ones (Cepeda et al., 2013). However, little research has been carried out in the Chilean context.

Method

This research follows a non-experimental design as no variables are manipulated in the study; only a stimulus through an associative controlled test is given to the participants in a laboratory context to activate the students' lexical items production.

The study was conducted in a subsidized school in San Pedro de la Paz (Chile). The participants in the study came from an original pool of 99 beginner learners (47 female, 52 male) of 5th grade (ages 10-11) in primary education.

Data were collected through a lexical availability test. "Lexical availability is measured by means of a test that reflects the participants' spontaneous vocabulary production" (Payne, 2016 p.18).

The lexical availability test includes the students' consent form, the information required about their gender, and five columns for the centers of interest to be studied (see Appendix A). These centers include topics that are part of the vocabulary keywords proposed by the Chilean national curriculum of English for 5th grade, they are family members, body parts, clothes, food and drinks, and animals (MINEDUC, 2012).

When the participants received the test, they were given the following instructions:

a. The test is answered voluntarily.

b. They are asked to mark their gender and consent for participating in the study.

c. The participants are asked to write as many words as possible (without a word limit) from the given topic in an open list included in the test within two minutes.

After the tests have been collected, they are all gathered and separated into two groups, girls, and boys. Then, the data were edited and included in order of appearance in an Excel spreadsheet for each of the centers of interest. The following exclusion criteria were considered to edit the data:

a. Tests that had a center of interest in blank were discarded.

b. Spanish words were discarded as well as words that do not appear as lexical entries in dictionaries.

c. Repeated words in the same center of interest were discarded.

d. Spelling mistakes were corrected if the meaning is understood from the word.

e. Singular forms were considered.

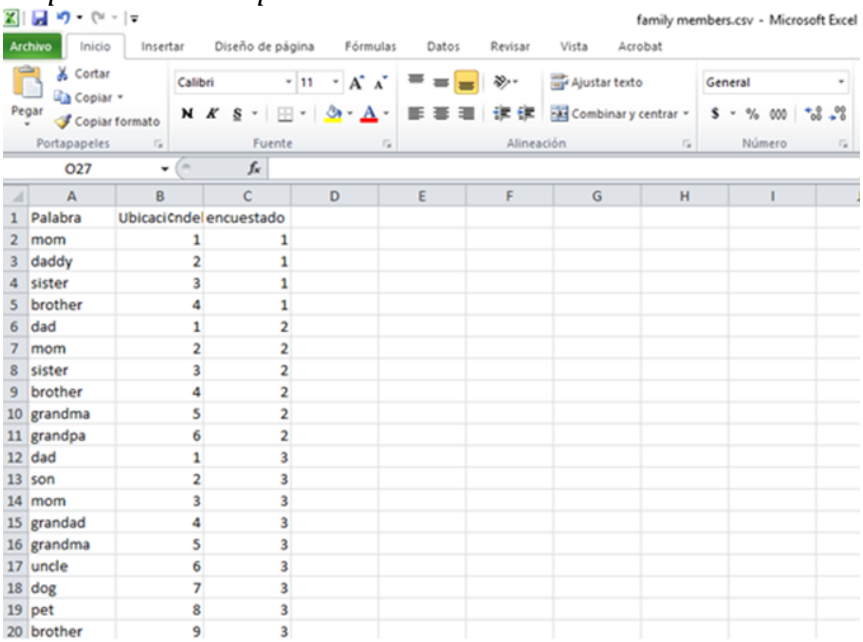
f. Brand names were deleted.

g. Words were edited in lowercase letters.

The data gathered from the participants' available lexicon were edited in a Microsoft Excel spreadsheet format (CSV), in the original word order from the test, separated by the two groups: one spreadsheet for a center of interest for boys, and another spreadsheet for the same center of interest for girls, following the same procedure for all the centers of interest. In the Excel spreadsheet, the first column corresponds to the words (produced by the participants) in order of appearance, the second column has the word position from the list of the test, and the third column has the participant number, as it appears in the example of Figure 2. A different spreadsheet for each of the centers of interest was used.

Figure 2

Microsoft Excel spreadsheet sample



family members.csv - Microsoft Excel

	A	B	C
1	Palabra	Ubicaci?ndel	encuestado
2	mom	1	1
3	daddy	2	1
4	sister	3	1
5	brother	4	1
6	dad	1	2
7	mom	2	2
8	sister	3	2
9	brother	4	2
10	grandma	5	2
11	grandpa	6	2
12	dad	1	3
13	son	2	3
14	mom	3	3
15	grandad	4	3
16	grandma	5	3
17	uncle	6	3
18	dog	7	3
19	pet	8	3
20	brother	9	3

Then, data were entered into the computational platform Lexmath (www.lexmath.com). The reports obtained in this platform (see Figure 3) display the words in a table ordered according to the lexical availability index. The information also includes the following indexes: the total of words (the number of collected words in the center of interest) TW, XW is the mean of the total words (the number of words collected in the center of interest divided into the number of individuals in the sample), TDW is the number of total different words collected, and CI is the Cohesion index that represents the similarity of words appearing in the sample (Salcedo, del Valle, Contreras & Pinninghoff, 2015).

Figure 3

Lexmath report sample

LexMath

Reporte.

Fecha:	02-12-2017
Categoría:	
N° de Encuestas Realizadas:	52

Total de Palabras	XR	PD	IC
350	6.73	36	0.18697

Palabra	Frecuencia Absoluta	Frecuencia Relativa	IDL
mom	43	0,82692	0,747888462
dad	41	0,78846	0,747846154
brother	47	0,90385	0,688152293
sister	44	0,84615	0,634467258
grandma	24	0,46154	0,306152864
grandpa	20	0,38462	0,2387799
grandad	18	0,34615	0,221652146
dog	17	0,32692	0,2012268
cat	12	0,23077	0,128924181
father	8	0,15385	0,1278936
grandmom	11	0,21154	0,124579047
uncle	8	0,15385	0,088833431
mother	5	0,09615	0,074942308
daddy	4	0,07692	0,069788462
granny	5	0,09615	0,059567712
son	5	0,09615	0,057173352

Results

The analysis is presented as follows: The TW, XW, TDW, and CI from both groups are going to be compared to see if there are quantitative differences in each of the centers of interest individually, followed by the ten most available words obtained in the semantic field to find out similarities in the LAI and type of words between the groups. Then, the analysis is going to present all the centers of interest, comparing the results of both groups. Finally, a statistical analysis using a t-test is going to be carried out for the indexes TW, XW, and TDW, to determine whether there are statistically significant differences between the mean of both groups.

Family Members

In the semantic field family members, Table 1 presents the results obtained from the preliminary analysis of the lexical availability of females and males.

Table 1
Family Members

Family members	TW	XW	TDW	CI
Females	343	**7.3**	**43**	0.16972
Males	**350**	6.73	36	**0.18697**

Males wrote seven more words than females who wrote 343 words, but females wrote one more word on average than males, with a mean of 7.3, and males with 6.73 words. Considering the different words, females outperformed with 43 different words within the group, seven more than males. This behavior could be interpreted because of the social characteristics of the female gender that is considered much closer to the topic family; therefore, they are more interested in this semantic field. Regarding the CI, it can be seen from the data in Table 1 that males have a higher cohesion than females, with 0.18697 compared to 0.16972. It is apparent from these results that the lexical production of both groups on the topic family members is similar, being males less diverse in their word availability.

Table 2
Family member's ten most frequent words

Females		Males	
Word	**LAI**	**Word**	**LAI**
MOM	0,810138085	MOM	0,747888462
DAD	0,756099787	DAD	0,747846154
BROTHER	0,691380702	BROTHER	0,688152293
SISTER	0,647334064	SISTER	0,634467258
DOG	0,283581843	GRANDMA	0,306152864
GRANDPA	0,236817806	GRANDPA	0,2387799
CAT	0,231968388	GRANDAD	0,221652146
GRANDMA	0,203760343	DOG	0,2012268
GRANDAD	0,199474409	CAT	0,128924181
GRANDMOM	0,144895159	FATHER	0,1278936

The results, as shown in Table 2, indicate that the first ten words produced by females and males are practically the same, which shows that both groups have a similar available lexicon. However, the difference in the order of the words in the lists is based on

the latency of the words in the speakers' minds. The four most available words in both groups are mom, dad, brother, and sister. These words represent the stereotype of a nuclear family (Quintanilla & Salcedo, 2019). The most available word for females and males is mom, with a lexical availability index of 0.810138085 and 0.747888462 respectively. The only different word from both groups is father from males and grandmom from females, but as a group the type of words provided are very homogeneous.

Animals

The results obtained for females and males in the semantic field animals, provided by Table 3, are similar too as the previous center of interest family members.

Table 3
Animals

Animals	TW	XW	TDW	CI
Females	648	**13.79**	**66**	0.2089
Males	**714**	13.73	62	**0.22146**

The mean of words produced by females is 13.79, almost the same as 13.73 from males. The different words were superior in females one more time, 4 more than the 62 obtained by males. The cohesion index is 0.2089 for females and 0.22146 for males. The total of words is the only data that presents different results, for females is 648 and for males is 66 higher, that is, 714 words. The results are higher than in any other center of interest, which could be because this was the last content work in the fifth-grade syllabus in this school, therefore, words are more available for the students.

Table 4
Animals' ten most frequent words

Females		Males	
Word	**LAI**	**Word**	**LAI**
CAT	0,703544118	DOG	0,726779565
DOG	0,702805557	CAT	0,67677419
CHEETAH	0,317787062	CHEETAH	0,401980163
ANT	0,31010264	LION	0,367191938
PANDA	0,288266191	PARROT	0,337896535
SPIDER	0,269132251	CROCODILE	0,336428785
CROCODILE	0,255498457	ELEPHANT	0,290945046
KOALA	0,254893206	MONKEY	0,290390858
ZEBRA	0,254650042	HIPPO	0,258285027
LION	0,246405624	ANT	0,250870574

The results, as shown in Table 4, indicate that in both groups the first three most available words of animals, cat, dog, and cheetah, are similar (Quintanilla & Kloss, 2020). Based on a cognitive standpoint, Hernández-Muñoz, Izura, and Ellis (2006) suggest that the appearance of cat and dog as the most available words of the center could be attributed to factors such as familiarity and typicality. Then, considering the following seven words, only two of them are the same appearing in a different order (lion and crocodile), the other five differ within females and males. The most available word for females is cat with an LAI of 0.703544118, and for males is dog with an LAI of 0.726779565.

Body Parts

The results obtained from the preliminary analysis of the available lexicon provided by both groups, females, and males in the semantic field body parts, are summarized in Table 5.

Table 5

Body parts

Body parts	TW	XW	TDW	CI
Females	382	**8.13**	28	**0.29027**
Males	**418**	8.04	**38**	0.21154

The total number of words produced by females, 382 words, is less than the words produced by males in 36 words. The other different result is the number of different words produced, which is higher in males than in females by 36%. This could be explained because males are socially considered more familiar with video games, and many of them include part of the vocabulary of body parts. The similar results are in the average of words produced, which are around 8, and in the cohesion index, which is a little higher in females, 0.29027 in females, and 0.21154 in males.

The semantic field body parts share the same ten most available words that appear in Table 6 in both groups, varying the order of availability, excepting face for females and fingers for males. The three most available words for females are eyes, nose, and mouth, and for males are in the eyes, legs, and nose, with an LAI for eyes of 0.650602457 for females and 0.643387033 for males.

Another important aspect that can be seen from the list of words in Table 6 is that some pairs of words are presented in the same order in both groups; these are nose-mouth, hand-head, and hair-ears. The reason for this behavior could be a phonetic association because these pairs of words have similar sounds.

Table 6

Body parts ten most frequent words

Females		Males	
Word	**LAI**	**Word**	**LAI**
EYES	0,650602457	EYES	0,643387033
NOSE	0,635018109	LEGS	0,520144505
MOUTH	0,473550377	NOSE	0,508889732
LEGS	0,449835917	MOUTH	0,440641708
HAIR	0,408146411	HEAD	0,421947692
EARS	0,379497138	HAND	0,390323574
HAND	0,36843857	FINGERS	0,342787179
HEAD	0,348327452	HAIR	0,296173232
TEETH	0,277255291	EARS	0,282970877
FACE	0,220403381	TEETH	0,203879

Food and Drinks

Table 7 compares the lexical availability of the semantic field food and drinks in females and males.

Table 7
Food and drinks

Food and drinks	TW	XW	TDW	CI
Females	**466**	**9.91**	**75**	**0.13220**
Males	431	8.29	74	0.11201

As can be seen from the table above, the results show that females have a better performance than males, they produced a total of 466 words compared to the 431 words produced by males. Females wrote on average almost ten words, while males wrote eight, findings that show a first small advantage for females. The variety of words is almost the same, 75 different words for females, and 74 different words for males, and the cohesion index is similar for both groups, but it is a little higher in females, 0.13220, compared to males 0.11201.

Table 8
Food and drinks ten most frequent words

Females		Males	
Word	**LAI**	**Word**	**LAI**
APPLE	0,402015987	APPLE	0,358920529
JUICE	0,379465722	JUICE	0,32094035
PIZZA	0,289556785	CHICKEN	0,30445102
MILK	0,266620566	WATER	0,284578917
COLA	0,262484894	COLA	0,239251923
BANANA	0,26246904	PIZZA	0,213324269
WATER	0,261919263	BANANA	0,213026414
CHICKEN	0,241325674	WATERMELON	0,199074334
ORANGE	0,229314166	ORANGE	0,187578127
WATERMELON	0,221504062	ICE-CREAM	0,183189881

Data from Table 8 reveals that the ten most available words are the same for females and males, except for *milk* for females and *ice-cream* for males. The first two words that appear in the list have the same order in both groups, they are *apple* and *juice,* and the LAI is higher in females, 0.402015987 and 0.379465722 compared to 0.358920529 and 0.32094035 in males.

Clothes

Within the semantic field *clothes*, Table 9 provides another overview of the similarities in the results of females and males in the lexical availability test.

Table 9
Clothes

Clothes	TW	XW	TDW	CI
Females	276	**5.87**	42	**0.13982**
Males	**277**	5.33	42	0.12683

The total of words provided by both groups is almost the same, only one word of difference in favor of males. The average of the available lexicon is five words for females and males, and they also have the same different words provided by both groups. The last index, cohesion, is higher in females, even though the difference is not relevant, 0.13982 compared to 0.12683. This is the semantic field that showed the most similar results.

Table 10
Clothes' ten most frequent words

Females		Males	
Word	**LAI**	**Word**	**LAI**
T-SHIRT	0,798099787	T-SHIRT	0,7156075
SHIRT	0,415358319	SHIRT	0,399807062
SHOES	0,353878691	JEANS	0,341558885
DRESS	0,291284511	SHOES	0,331619971
JEANS	0,269736436	SHORT	0,304590192
SHORT	0,258961277	JACKET	0,234261193
SOCKS	0,187996774	JUMPER	0,230233885
PANTS	0,183247681	PANTS	0,209712135
JACKET	0,143133967	SOCKS	0,192994635
SKIRT	0,123682728	HAT	0,116336817

Table 10 above illustrates the similarities between the ten most available words provided by females and males in the semantic field of *clothes*. This center presents the same characteristics as the other four semantic fields analyzed before. It is possible to observe a similar available lexicon for the first ten words produced by both groups, except for two words, *dress* and *skirt* for females, and *jumper* and *hat* for males, a difference that can be because *dress* and *skirt* are clothes connected mostly to females, therefore, is a more available lexicon for them. A coincidence in the first two words is present among females and males, the words *t-shirt* and *shirt* are the most available words for both groups, varying only in the LAI, which is a little higher in females.

Analysis by gender

Regarding gender, results are presented below separated for females and males within the five centers of interest considered in the lexical availability tests.

It can be seen from the data in Table 11 and Table 12 gathered from females and males' lexical availability in all centers of interest, that the most productive semantic field for both groups is *animals,* followed by *food and drinks, body parts, family members* and *clothes.* It is important to highlight that the number of words in the most productive center of interest, *animals*, is greatly above the number of words obtained in the least productive center of interest, *clothes*, with a difference of 372 words for females and 437 words for males.

Table 11
Females

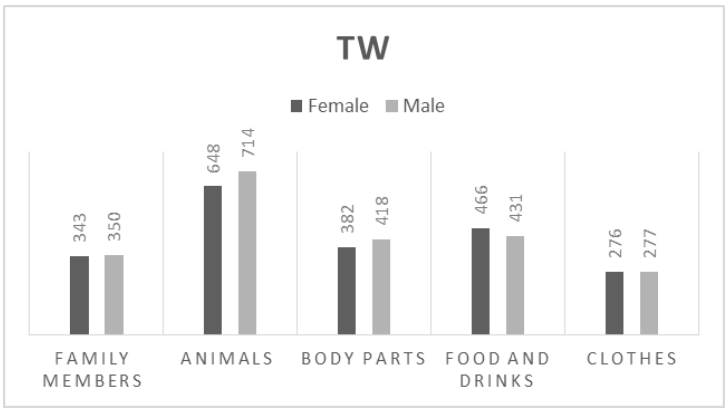
Center of interest	**TW**	**XW**	**TDW**	**CI**
Family members	343	7.3	43	0.16972
Animals	648	13.79	66	0.20890
Body parts	382	8.13	28	0.29027
Food and drinks	466	9.91	75	0.13220
Clothes	276	5.87	42	0.13982
Mean	**423**	**9**	**50.8**	**0.188182**

Table 12
Males

Center of interest	TW	XW	TDW	CI
Family members	350	6.73	36	0.18697
Animals	714	13.73	62	0.22146
Body parts	418	8.04	38	0.21154
Food and drinks	431	8.29	74	0.11201
Clothes	277	5.33	42	0.12683
Mean	**438**	**8.424**	**50.4**	**0.171762**

Comparing the total number of available words produced by both groups, as seen in Figure 4, in all centers of interest males outperformed females, except in the semantic field *food and drinks* where females had a better performance, results that showed no relevant differences.

Figure 4
Total of words

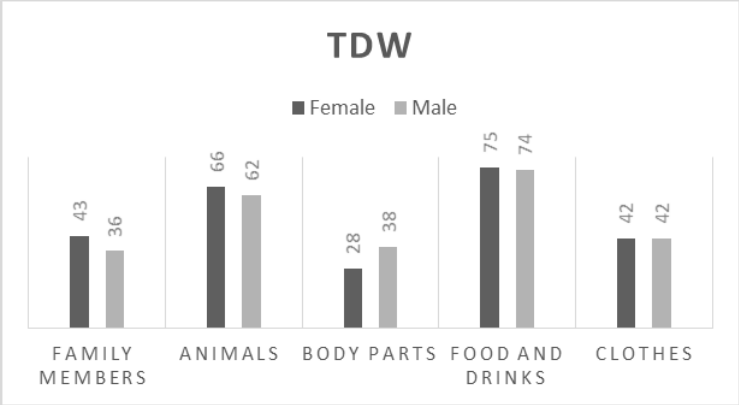


According to the results presented in Figure 5, obtained for the mean of words, females had a better performance than males in all centers of interest, a difference that is not relevant; however, this indicates that as a group the average of available words in females is higher, meaning that as a group they are more homogeneous in lexical availability.

Finally, considering the different words (Figure 6), the only center of interest that showed more different results in the two groups was in *body parts,* where males produced a wider range of different words, ten more than females.

Figure 5
Mean of words

Figure 6
Total different words



Statistical analysis

A simple statistical analysis was used to see if there are any significant differences between the results of lexical availability between females and males. The results considered for this analysis were the total of words, the mean of words produced, and the different words in both groups. T-tests were used to analyze the relationship between the results obtained by females and males.

Table 13
Total of words

TW	Females	Males
Mean	423	438
P(T<=t)	0,882253819	

The first statistical analysis examined the effect of the variable gender on the total of words produced by fifth-grade students in a subsidized school. It can be seen from the data in Table 13 that the group of males wrote 15 more words than females, 423 words compared to 438. From these results we can see that p = 0,882, and it is > 0,05, indicating that the difference between both groups is not statistically significant.

Table 14
Average of words

XW	Females	Males
Mean	9	8,424
P(T<=t)	0,777928818	

The second statistical analysis examined the impact of the variable gender on the mean of words produced by the same group of students. The results obtained from the preliminary analysis can be compared in Table 14, where the mean of words obtained by females and males are almost the same, 9 and 8,4 each. According to the result of p = 0,78 which is > 0,05, there were no significant differences between the two groups.

Table 15
Total number of different words

TDW	Females	Males
Mean	50,8	50,4
P(T<=t)	0,972863227	

From the data in Table 15, we can see that the total number of different words produced by females and males is the same, around 50 words. All the students have the same different available lexicon on average for all the centers of interest, therefore, according to the value of p= 0.97, being > 0.05, no significant differences were found between the two groups.

The results presented above seem to reflect the null effect of gender in the variable lexical availability of fifth-grade students in a subsidized school in Chile.

Discussion and conclusions

The present study was designed to determine the effect of the variable gender on the L2 available lexicon of primary students from a subsidized school in Chile. Interestingly, the findings of this investigation show that gender is a variable that does not affect the available lexicon produced by fifth-grade Chilean students, because of the very similar results obtained by females and males in the vocabulary in all the semantic fields presented in the lexical availability task (family members, animals, body parts, food and drinks and clothes).

The first question in this study sought to determine the average number of words that female and male primary students produced in a lexical availability task. On average, from the five centers of interest included in the lexical availability test, females produced a total of 423 words in each center of interest, 3.42 % less than the total of 438 words produced by males, a difference that was statistically not significant. When analyzing the average of words produced by each student in each of the five centers of interest, females produced 9 words and males 8.4 words, a difference that statistically was also not significant. In summary, these results show that males as a group produce more words in all the centers of interest than females, but females as a group are more homogeneous in terms of lexical availability because individually on average in each of the centers of interest, they produce more words than males. However, the findings of the current study do not support the previous research of Jiménez and Ojeda (2009), Fernández (2010), Verdeses-Mirabal (2012), Sandu (2012), and Agustín-Llach and Fernández (2014) who

state that gender is a variable that has a major incidence in the lexical availability of students, confirming that females always outperform males, showing a richer and more varied lexical competence (Abibi, 2021).

The second question in this research was if there were any differences in the type of words produced by females and males in a lexical availability task. The available lexicon from students is more productive in some cue words than others. Males produce more words in the semantic fields animals, body parts, and family members, whereas females are more productive in the semantic fields food and drinks, and clothes, even though these differences are not statistically significant.

When analyzing qualitative differences, we confirm that differences are more qualitative than quantitative, as stated by Cepeda et al. (2013). Even though the average of words produced by each of the students in each center of interest is very similar for females and males, the difference comes from the different words they produce in all the centers of interest, except clothes. In the semantic field family members, animals, and food and drinks, females produce more different words than males, who produce more words in the semantic field body parts. Also, in general, the ten most available words tend to be very similar in both groups. However, the order of appearance (availability) varies between males and females. This finding corroborates the ideas of Sandu (2012), who claims that despite the high percentage of common words produced by females and males, the variable gender affects the order in which the words appear. Other research indicates that qualitative differences may be due to the thematic differentiation of specific centers of interest that refer to activities or attributes traditionally regarded as feminine or masculine (Fernandez-Merino, 2014; Pacheco, Cabrera & Gonzalez, 2017).

The results obtained in this study, in the opinion of the authors, are undoubtedly the result of the low linguistic level of the subjects in the sample. It is possible that no major differences were observed between men and women at both the quantitative and qualitative levels due to the low vocabulary of both groups.

This work contributes to the existing knowledge of lexical availability among primary students in the Chilean context and the effect of the variable gender in the L2 available lexicon. The present study provides additional evidence with respect to the fact that gender would not be an important variable that affects the quantitative results of lexical availability. The empirical findings in this study also provide a qualitative analysis of the most available lexicon within female and male primary students, and the difference between them, which practically does not exist in research related to gender effect in EFL lexical availability, which was even a suggestion for future research in the study carried out by Jiménez and Ojeda (2009) and Aabidi (2021). The evidence provided by the study is also important information that can be used to develop targeted interventions aimed to improve vocabulary learning practices inside our classrooms, to enhance vocabulary acquisition in an inclusive and effective way.

The generalizability of these results is subject to certain limitations because of the characteristics of the sample, as it only corresponds to the reality of primary students from a Chilean subsidized school. However, the size of this sample of 97 students is not less relevant comparing it with the 200 students in most of the other similar studies. There is a need for more research because of the lack of empirical evidence in this area.

Future research should, therefore, concentrate on the investigation of the gender effect in vocabulary learning in second language acquisition, considering, for example, the qualitative differences among females and males' lexical availability in different semantic fields, and the difference over time considering gender effect on students' lexical availability at different school levels.

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