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Journal of Technical Education

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The works must be unpublished and refer to topics of Evaluation, teaching and teaching, learning and development of cognitive processes, Planning for the potentializing of learning, Development of competencies through expected learning and other topics related to Humanities and Behavioral Sciences.

Presentation of the Content

In the first article we present *Knowledge diagnosis of trigonometric functions in engineering students*, by ENCINAS-PABLOS, Francisco Javier, PERALTA-GARCÍA, Julia Xochilt, CUEVAS-SALAZAR, Omar and OSORIO-SÁNCHEZ, Mucio, with adscription in Instituto Tecnológico de Sonora, with second article we present *Knowledge and importance of sex education in young university students of the Academic Unit of the North of the State of Nayarit of the Universidad Autónoma de Nayarit*, by CHÁVEZ-SÁNCHEZ, Gabriela, CHÁVEZ-SÁNCHEZ, Haydee del Carmen and GONZÁLEZ-BASILIO, Sofía de Jesús, with adscription in the Universidad Autónoma de Nayarit, as third article we present *The role of feedback in decision making learning in Psychology: critical thinking and flexibility*, by COLMENARES-VÁZQUEZ, Ligia, TORRES-LÓPEZ, Guadalupe Yamilet and SANTOYO-VELASCO, Carlos, with adscription in the Universidad Nacional Autónoma de México, as a fourth article we present *Parental competencies: descriptive study based on the actions of university social responsability*, by CASANOVA-SÁNCHEZ, Estanislao, BERUMEN-GONZÁLEZ, Andrea Crisely, RIVERA-IRIBARREN, Maricel and DÁVILA-NAVARRO, Mónica Cecilia, with adscription at the Instituto Tecnológico de Sonora.

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Knowledge diagnosis of trigonometric functions in engineering students

Diagnóstico del conocimiento de las funciones trigonométricas en estudiantes de ingeniería

ENCINAS-PABLOS, Francisco Javier†*, PERALTA-GARCÍA, Julia Xochilt, CUEVAS-SALAZAR, Omar and OSORIO-SÁNCHEZ, Mucio

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Abstract

Most students who begin university studies in Mexico do not have basic knowledge of mathematical objects, which causes students to fail due to poor performance. Therefore, the objective of this paper was to diagnose the prior knowledge of trigonometric sine and cosine functions in engineering students of a university in order to use this information in a didactic proposal that improves learning in such mathematical objects. For this purpose, an evaluation instrument was designed using the conceptual framework of Duval's semiotic representations and it was applied to a representative sample of 42 randomly chosen engineering students. It was found that the students have strengths in the cognitive activity of Treatment of the Graphic Register and in the Conversion of the Tabular Register to a graph. But they have deficiencies in the Treatment of the Tabular Register and in the Conversions from a Graphical to an Algebraic Register, and also from the Algebraic to the Tabular Register, both in the sine function, and only from the Tabular to the Algebraic in the case of the cosine function. It is recommended to enhance this knowledge in a teaching proposal to improve learning performance outcomes.

Diagnosis, Trigonometric functions, Semiotic representation

Resumen

La mayoría de los estudiantes que ingresan a las universidades en México no poseen conocimientos básicos de los objetos matemáticos, lo que provoca reprobación por bajo aprovechamiento. Por lo anterior el objetivo de este trabajo consistió en diagnosticar los conocimientos previos de las funciones trigonométricas seno y coseno en alumnos de ingeniería de una universidad, para utilizar esta información en una propuesta didáctica que mejore el aprendizaje en ese objeto matemático. Para ello se diseñó un instrumento de evaluación mediante el marco conceptual de las representaciones semióticas de Duval y se aplicó a una muestra representativa de 42 estudiantes de ingeniería elegida al azar. Se encontró que los alumnos tienen fortalezas en la actividad cognitiva de Tratamiento del registro gráfico y en la Conversión del registro tabular al gráfico. Pero tienen deficiencias en el Tratamiento del registro tabular y en las Conversiones del registro gráfico al algebraico, del registro algebraico al tabular, ambas en la función seno, y del tabular al algebraico en la función coseno. Se recomienda potenciar este conocimiento en una propuesta de enseñanza para mejorar los resultados de aprendizaje.

Diagnóstico, Funciones trigonométricas, Representación semiótica

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Introduction

Scientific and technological advances impose great challenges on higher education institutions, since they require training engineering professionals for an increasingly globalized and changing world of work. That is why in recent years there has been a growing interest in offering educational projects based on professional skills, with the intention of preparing professionals in a comprehensive manner, so that they apply their knowledge, skills, attitudes and values in the search for creative and innovative solutions to the problems of their professional practice (Martínez, 2014; Muñoz-La Rivera, Hermosilla, Delgadillo, & Echeverría, 2021).

Solving problems in engineering demands the use of mathematics, because it allows the data of any situation within a specific professional field to be modeled, analyzed and interpreted. This enables the possibility of discovering which paths to follow in order to reach solutions for a given problem. For this reason, mathematics is one of the basic sciences that are essential for the training of engineers (González, 2015; Sharhorodska, Padrón, & Bedregal, 2018).

Unfortunately, in Mexico it has been detected that there is poor mathematical training in students who graduate from high school. According to the last application of the PLANEA exam carried out in 2017, 66 out of 100 students reached only level I of proficiency, which represents the lowest level of the test. In addition, another 23 managed to reach level II. In other words, it was reported that 89 percent of high school graduates do not have a satisfactory command of the knowledge of their educational level at the time of finishing their studies (Secretaría de Educación Pública, s.f.).

This situation is probably the reason why not many high school graduates decide to study engineering. According to Quintero (2020), in a recent school year only 22% of university graduates were engineers. Currently there is a significant gap between the demand for this type of professionals by companies, and the supply offered by the country's universities. Demand exceeds supply, therefore there is a significant deficit of engineers in Mexico (Moreno, 2017; Magallanes, 2018).

On the other hand, the insufficient mathematical training of those who enter engineering careers also affects their school career to a certain degree. According to some studies, engineering students are the ones who fall behind the most during the first semesters of their training, due to the phenomenon of failure (Luna, 2020; Murillo-García, & Luna-Serrano, 2021).

Faced with this situation, universities have carried out some actions aimed at improving the progress of students in their school career. The reviewed literature shows that one of the strategies has been the development of studies that intend to understand the level of mathematical competences with which students enter university. The idea is to identify their strengths and weaknesses and take advantage of this knowledge to program teaching in a more suitable and effective way (Barrón, Ruiz, Luna, Estrada, & Loera, 2013; Minnaard, 2016; Carrasco, 2017; Gamboa, Castillo, & Hidalgo, 2019; Sánchez, Vidal, Molina, Reina, Guayasamín, & Pérez, 2019; Más, Sánchez, & Alegría, 2020).

It is within the scope of this line of research that the information reported herein is contained. The present research is related to the study of previous knowledge that students who enter an engineering career have on the subject of trigonometric functions, specifically the sine and cosine functions. The intention is to collect information that serves to program their teaching through experiences that contribute to meaningful learning instead of rote learning.

For diagnosis, the conceptual framework of Duval's semiotic representations (1998, 2010) is used, it establishes the conditions that must be met to consider that a mathematical object has been grasped. On the basis of the above, the objectives of this paper are:

General objective

Diagnose prior knowledge of the trigonometric sine and cosine functions in engineering students of a university, through the conceptual framework of Duval's semiotic representations, to use the information in a didactic proposal that improves the learning results of the students in such mathematical object.

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Specific objectives

a) Design a questionnaire based on the framework of Duval's semiotic representations, through a table of specifications, to determine the strengths and areas of opportunity of students around the mathematical concept of trigonometric functions.

b) Design a questionnaire based on the framework of Duval's semiotic representations, through a table of specifications, to determine the strengths and areas of opportunity of students in regard to the mathematical concept of trigonometric functions.

Justification

Functions are very important objects of study for mathematics and also for other sciences, since they are essential to develop certain concepts and serve as a model to explain a wide variety of phenomena. There are different types of functions and among these we find trigonometric functions. These have an important application in the phenomena that have to do with periodicity, which is why they are widely used in many sciences and engineering subjects. Trigonometry is a very old branch of mathematics and it was introduced in the 16th century as an essential tool for the development of mathematics (Cabrera, 2009).

In Mexico, the study of trigonometry begins from high school to university levels, so it is significant to identify the problems that occur at each school level, when teaching and learning concepts such as angle, conversions, trigonometric ratio, periodicity, among others; in order to improve the teaching and learning process of the trigonometric function concept (Montiel-Espinosa, & Cantoral, 2005).

In a study conducted with high school students, Aray, Guerrero, Montenegro, and Navarrete (2020) found that the difficulties students have when using trigonometric functions result from a lack of understanding of the basic concepts of this branch. They argue that at pre-university levels the training in trigonometry must be elementary and basic so that they can be used successfully at university levels.

As already mentioned, mathematics represents a learning problem for students entering university, and the academic unit where this work is carried out is no exception. According to reports from the academy in charge of teaching trigonometric functions, in the last school year, almost 50 percent of the students did not achieve the minimum desired performance, then, it is evident that some sort of intervention is needed to improve these results.

Consequently, the present research is justified, as its findings provide valuable information that can be used to identify areas of opportunity in the process of teaching and learning this mathematical object. Teaching can be organized to make learning more meaningful in the light of students' prior knowledge, thereby achieving better learning outcomes with lower failure rates.

By reducing failure, the transit of students in their school career is streamlined and thus contributes to reducing lag and improving the terminal efficiency of Educational Programs, indicators that affect many universities in the country.

Theoretical framework

Representation theory

Mathematical activity is in a very privileged place to analyze certain cognitive activities of the individual, such as conceptualization, problem solving, among others. In particular, the learning of mathematics requires the use of expression and representation systems for the cognitive functioning of thought, whether these systems are numerical systems, algebraic systems, Cartesian systems, or natural language. (Duval, 2010). Having access to and communicating mathematical objects relies heavily on their representations, so this research explores the use of Raymond Duval's semiotic representation registers, which are precisely framed in the phenomenon of the representation. Duval (1988, 2012) argues that mathematical objects are not clearly possible to perception, because of this a variety of semiotic representations of the object are necessary, but they should not be confused with the object itself, this is an imperative point for understanding math.

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Semiotic representations are those used to represent mathematical objects, they are constituted by the use of signs or symbols that belong to a representation system in which they have their own meanings and rules of operation. For example, a formula represents symbols or signs that are identified as an algebraic representation of the algebraic system, a graphical representation of the Cartesian system, a numerical table of the tabular system or a statement of natural language.

It is extremely important that there are diverse and varied semiotic representations of a mathematical object in order to interact, communicate and develop mathematical activity; likewise, the transformation of one semiotic representation into another that can be in the same register or from one register to another are essential activities. In this regard, Duval emphasizes that this second transformation is fundamental for the understanding of mathematical objects. According to Rojas (2012), transformations in the same register could also bring about various difficulties in the understanding of mathematics. Duval differentiates these two types of transformations as *treatments* and *conversions*.

Semiotic systems must be registers of representation to allow three fundamental cognitive activities associated with every representation, the first is the *formation* of a set of signs or symbols that are identifiable as a representation of something in a given system; for example, a formula y = 2 sin (3x+π) is identifiable in the algebraic log. The formation units and rules that are specific to each register are already given in the register and the important thing about this activity is to be able recognize them.

The second activity is *treatment*, which is the transformation of a representation in the same register in which it was formed, using only the rules specific to that register. For example, considering the algebraic register in the expression y = 2 sin (3x+π) if it is required to identify the "period" of the trigonometric function, certain algebraic manipulations must be carried out to find it, in other words, a treatment must be carried out algebraic with rules associated to that register.

Lastly, the third activity associated with semiotic representation registers is *conversion*, this is the transformation of one representation into another that belongs to another register, preserving all or only part of the content of the initial representation. According to Duval (1998) "The conversion is an external transformation to the starting register" (p. 276). For example, Figure 1 shows the algebraic expression of a trigonometric function and its conversion to the graph log. In the conversion activity you can keep all or only a part of the initial representation (algebraic representation).

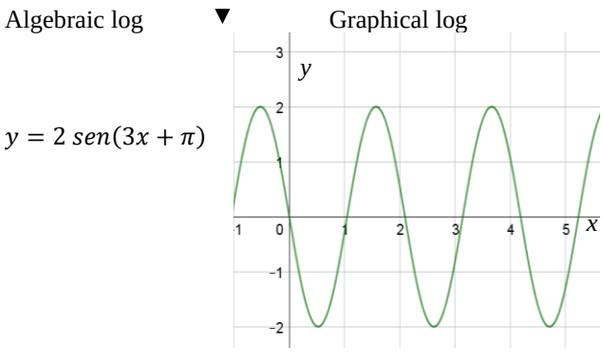

Figure 1 The algebraic and graphical representation of a trigonometric function
Source: Own elaboration

Converting from one register to another is often a difficult activity when there is no consistency between the registers. If there is congruence between the start and end representations, the conversion is trivial. A case of congruence in Figure 1, is the coefficient 2 that appears in the equation and in the graph, the same 2 can be seen on the Y axis which can be identified as the height of the wave; this is the element that corresponds to the term “amplitude” of the trigonometric function in both registers. But if we refer to the "period", it can be seen on the graph when the two waves are completed and it is measured as the horizontal distance from where the wave begins to where it begins again, but in the algebraic expression certain algebraic calculations are required to reach the value of the "period" which is P=2/3 π, in the light of the above, it is possible to exemplify the non-congruence between registers for the concept of "period".

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Therefore, the use of various registers to present the same concept is possible, as can be seen in the case of the "period", in this case the graph and the algebraic were used and there is no direct relationship between the two registers, so making a conversion between registers spontaneously will be difficult; hence, it is important to point out that the conversion activity needs to be taken into account in the teaching and learning process, starting from presenting specific tasks to the student (Duval, 1998).

Research methodology

This section describes the fundamental points of this work, such as: the type of research that was carried out, the subjects that took part in the study, the instrument used to collect information and the procedure followed to achieve the objective that was set in the inquiry.

Type of research

Based on the data collected from the participants, this report is of a quantitative nature, since the answers to a specific number of questions were numerical. But it is also cross-sectional, because the data was collected simultaneously from all the subjects at a specific moment of the inquiry.

Participants

42 randomly chosen students from engineering careers who were in the second semester at the Instituto Tecnológico de Sonora participated. Of these, nine were women and 33 men. The age of the participants fluctuated between 18 and 20 years.

Instrument

The questionnaire used to collect information (Table 1) was made up of nine multiple-choice items related to the trigonometric functions sine and cosine. Three of these were designed so that the students reflected the Treatment activity, one in the algebraic register, another in the graphic register and a third item in the tabular register. The other six items of the instrument were raised to observe if the students were able to carry out Conversions in both directions among the registers: graphic algebraic ↔, tabular ↔ algebraic and graphic ↔ tabular.

Procedure

The first activity was to develop the measuring instrument, with which the data of the investigation would be collected. This task was carried out based on the conceptual framework of Duval's semiotic representations (1998). In accordance with this theory, it was decided to include three semiotic representations of the trigonometric functions: the algebraic register, the graphic register and the tabular register, since they are the most common registers found in mathematical literature. To achieve validity of the content of the instrument, a table of specifications was used to relate the learning contents with Duval's cognitive activities according to the recommendations of Santibáñez (2011).

R	CA	Register Ini-Fin	Task
1	TR	A-A	Find the period of the function $y = 5sen\left(\frac{1}{2}t\right) + 1$
2	TR	G-G	Find the period and amplitude of the function in the graph.
3	TR	T-T	Find the amplitude and the period in a number table.
4	CO	A-G	Given the algebraic expression, identify from 4 graphs which one it corresponds to.
5	CO	G-A	The graphic of the trigonometric function is shown, and it is requested to identify which of the 4 equations shown is correct.
6	CO	T-A	It is requested to find A and B of the function $X(t) = Acos(Bt)$ in a numerical table.
7	CO	A-T	Given $T(t) = -8\,sen\left(\frac{\pi}{12}t\right) + 10$ the student is asked to complete the table and identify the maximun temperature.
8	CO	G-T	Starting from the graph of a trigonometric function and pointing out some points: A, B, C, D and E complete the table.
9	CO	T-G	Given three tables relate to their respective graphic.
Note: R=reactive; CA=cognitive activity; TR=treatment; CO=conversion; Ini=initial; Fin=end; A=algebraic; G=graphic; T=table			

Table 1 Task requested by each instrument item

The next step consisted of presenting the instrument to three experts in the teaching area so that they could validate that it evaluated what it was supposed to evaluate. Subsequently, the instrument was applied to a small group of students to rule out possible errors in their writing.

The next activity was to qualitatively classify the difficulty indices of the items, as recommended by Díaz and Leyva (2013). It was established that an item with an index greater than or equal to 0.9 would be considered easy. An item with an index from 0.8 to 0.89 would be a moderately easy item. From 0.7 to 0.79 the item would be of medium difficulty. From 0.5 to 0.69 it would be considered moderately difficult and less than 0.5 would be classified as a difficult item.

With the instrument already designed in its final version, a representative sample of engineering students was randomly selected in order to apply the measuring instrument to them at the initial moment of teaching trigonometric functions.

Finally, the responses of the students who made up the sample were coded, the difficulty indexes of each item were determined and they were classified qualitatively. With this activity, the difficulties and strengths of the students were identified, in terms of cognitive activities, so the objective of the research was achieved.

Results

42 students participated in the study, they answered nine items related to trigonometric functions, in the representation registers: tabular, algebraic and graphic. Three items corresponded to the cognitive activity of Treatment in each of the registers, and the remaining six items corresponded to the cognitive activity of Conversion of the three registers in both directions. The activity of the students was observed and their strengths and weaknesses were recorded.

Table 2 shows the average difficulty indices in the two cognitive activities that were evaluated with the instrument. The Conversion items had on average a smaller difficulty index than the Treatment items.

This means that the Conversions were more difficult for the students than the Treatments. This result seems reasonable in the light of the theory of semiotic representations. For Duval (1998, 2010), performing a Conversion is a task that demands a greater understanding of the mathematical object than the Treatment activity.

Cognitive activity	Successful items	Difficulty Index
Treatment	75	0.595
Conversion	131	0.520

Table 2 Average number of correct items and average index of difficulty by cognitive activity

Regarding the performance of the students in each item of the instrument, Table 3 shows that four of the nine items were difficult for the students, three were moderately difficult, one was of medium difficulty and another was classified as an easy item. These results show that students initially have little understanding of trigonometric functions, which confirms the low level of mathematical skills in students who graduate from high school and start university studies in Mexico. According to the Planea test applied by Secretaría de Educación Pública (s.f.), 89 percent of high school graduates in Mexico do not have a satisfactory command of mathematics.

Regarding the cognitive activity of Treatment, it was observed that the students showed strength in the graphic register and deficiency in the tabular register. On the other hand, in the cognitive activity of Conversion, their strengths were located only in the Conversion of the tabular register to the graph, but deficiencies were found in three Conversions: from the graphic register to the algebraic, from the algebraic to the tabular, both in the sine function and from tabular to algebraic in the cosine function.

R	CA	Register Ini-Fin	Difficulty index	Index classification
1	TR	A-A	0.57	MD
2	TR	G-G	0.79	DM
3	TR	T-T	0.43	D
4	CO	A-G	0.55	MD
5	CO	G-A	0.38	D
6	CO	T-A	0.40	D
7	CO	A-T	0.24	D
8	CO	G-T	0.62	MD
9	CO	T-G	0.90	E

Table 3 Index of difficulty of each item and its classification according to its value

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Note: R=reactive; CA=cognitive activity; TR=treatment; CO=conversion; Ini=initial; Fin=end; A=algebraic; G=graphic; T=tabular; E=easy; ME= moderately easy; DM=medium difficulty; MD=moderately difficult; D=difficult

The fact that the areas of opportunity or improvement are observed more in the Conversions is possibly due to the fact that teachers do not commonly propose this type of cognitive activity in the learning tasks of their students, or also because the same bibliography used in teaching does not develop this type of activity deliberately. In a study carried out by Aponte (2016), it was found that textbooks do use different representations of trigonometric functions, but do not perform conversions from one representation to another, which hinders the understanding of this mathematical object.

However, Table 3 interestingly shows that item nine was the easiest item on the test. This consisted of a Conversion of the tabular register to the graph (Figure 2).

When reviewing the item in detail, it was found that apparently the students only verified the coincidence of the coordinates of a point in each table, with the coordinates of that point in one of the three graphs, which made it easier for them to distinguish which was the correct answer. Duval (1988) calls this congruence among registers, which means that the parameters of the original register (tabular) are easily observed in the final register (graphic). For this reason, this item should be modified in future applications of the instrument.

9. Match each table with its corresponding graph.

x	*y*
0	0
π	-2.8
2π	-4
3π	-2.8

Table 1

x	*y*
0	0
π	-4
2π	0
3π	4

Table 2

x	*y*
0	-4
π	0
2π	4
3π	0

Table 3

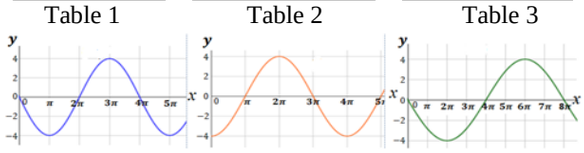

Table [ ] Table [ ] Table [ ]

Figure 2 Conversion item of the tabular register to the graphic register
Source: Own elaboration

On the other hand, the opposite occurred with the remaining Conversion items four through eight. For example, in item six (Figure 3), no consistency was recorded in the requested parameters of the initial register and the final register, which is why the Conversion activity requested in these items is not spontaneous and needs to be taken into account in the teaching process (Duval, 1998).

6. The following table shows the instantaneous positions of a mobile with oscillatory movement. Determine the values A and B in the function x =A Cos (B t) that models the following table:

t *(seconds)*	***x*** *(meters)*
0	-20
1	-10
2	0
3	10
4	20
5	10
6	0
7	-10
8	-20

A) A= 20, B = π/4
B) A = 10, B = 2π
C) A = 20, B = π/8
D) A = 10, B = 8

Figure 3 Conversion item from the tabular register to the algebraic register.
Source: Own elaboration

Finally, with the results obtained, it has become clear what strengths and areas of opportunity are in the teaching of trigonometric functions in the subjects studied. With this knowledge, as Agoiz (2019) mentions, teaching can be organized in order to enhance the previous knowledge that students have and thereby improve their academic performance. A strategy that is common in the teaching of mathematics and that has been used in various studies such as those carried out by Carrasco (2017), Sánchez et al. (2019) and Más et al. (2020).

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According to the reviewed literature, it seems reasonable to recommend the use of some technological applications in the teaching of trigonometric functions. Studies carried out by some researchers report good learning results and conclude that the use of dynamic software such as GeoGebra or other similar ones is a great pedagogical aid, because they make it possible for students to generate different representations of trigonometric functions by manipulating some of their parameters. (Aristizábal-Zapata, Jiménez-Rojas, & Álvarez-Martínez, 2015; Molina-Toro, Villa-Ochoa, & Suárez, 2018; Vergara, 2021). Other studies such as the one carried out by Trípoli, Torroba, Devece, and Aquilano (2019), also point out the benefits of using physics laboratory equipment where an oscillating mobile is observed and measured, in addition to complementing learning tasks with the use of GeoGebra software. The idea is to start from something concrete, an observable phenomenon in the eyes of the students, and delve into the mathematical object as the software is used to dynamize the representations and thereby generate a deeper conception.

Conclusions

The general objective of the research was achieved, which consisted in the diagnosis of the previous knowledge that engineering students have of the mathematical object trigonometric functions.

It was identified that the students show strength in the cognitive activity of Treatment in the graphic register and Conversion from the tabular register to the graph.

On the other hand, the findings of this research show that the areas of opportunity in students are located in the cognitive activity of Treatment of the tabular register, and in the Conversions of the graphical to the algebraic register of the sine function, from the tabular to the algebraic of the cosine function and from the algebraic to the tabular of the sine function.

Therefore, it is recommended that the teaching of trigonometric functions should be programmed based on this prior knowledge that students have. The idea is to tackle the areas of opportunity that have been identified, without neglecting the cognitive activities where they show strengths.

In the same way and according to the reviewed literature, it is recommended to use a simulator or software such as GeoGebra as much as possible within the teaching-learning process, since it allows the student to manipulate the different representations of the trigonometric functions, which can contribute to a more comprehensive understanding and depth of the mathematical object. These and other innovations can be implemented in future research projects.

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Knowledge and importance of sex education in young university students of the Academic Unit of the North of the State of Nayarit of the Universidad Autónoma de Nayarit

Conocimiento e importancia de la educación sexual en los jóvenes universitarios de la Unidad Académica del Norte del Estado de Nayarit de la Universidad Autónoma de Nayarit

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Abstract

Sex education is a topic formally included in the plans and programs of studies at the different educational levels, however, and despite the efforts that continue to be made to form and generate a culture related to it, in many places it continues to be a tabo or content that generates controversy within the family or community. In that sense, knowing the importance that this has for university education is something of great relevance, for which the present text reports the results obtained in relation to the object of study of Sexual Education in the students of the Academic Unit of the North of the Nayarit State of the Autonomous University of Nayarit, as a significant aspect in their personal and professional training. For the development of this study, a validated and adapted survey on sexual education by Dzib and Hernández (2016) was used, applied through a google form that was sent to all students. The total number of responses was 247; The results showed that most of the respondents are informed, but they express their desire to be provided with advice and relevant information about sexual education in the Academic Unit. Once the information was collected, the results were graphed and based on them a series of strategies and recommendations are proposed for the benefit of the Academic Unit, students and society in general.

Sex education, University training and dissemination strategies

Resumen

La educación sexual es un tema incorporado de manera formal en los planes y programas de estudios en los distintos niveles educativos, sin embargo y, a pesar de los esfuerzos que se siguen realizado por formar y generar una cultura relacionado a ello, en muchos lugares sigue siendo un tabo o un contenido que genera controversia entre la familia o comunidad. En ese sentido, conocer la importancia que éste tiene para la formación universitaria es algo de gran relevancia, por lo que el presente texto reporta los resultados obtenidos en relación al objeto de estudio de la Educación Sexual en los estudiantes de la Unidad Académica del Norte del Estado de Nayarit de la Universidad Autónoma de Nayarit, como aspecto significativo en su formación personal y profesional. Para el desarrollo de este estudio se utilizó una encuesta validada y adaptada sobre educación sexual de Dzib y Hernández (2016), aplicada mediante formulario google que se envió a todos los estudiantes. El total de respuestas fue de 247; los resultados reflejaron que la mayoría de los encuestados están informados, pero manifiestan su deseo a que se les brinde asesoría e información pertinente acerca de educación sexual en la Unidad Académica. Una vez recabada la información se graficaron los resultados y en base a ellos se proponen una serie de estrategias y recomendaciones en beneficio de la Unidad Académica, alumnos y sociedad en general.

Educación sexual, Formación universitaria y estrategias de difusión

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Introduction

According to Ríos et al. (2018), sexuality education is a basic element to promote the sexual health of all people. And which should be a collaborative work between the health sector and educational institutions, because the latter have a great potential in the development and transformation of future generations, as well as in the reconstruction of the social fabric.

Some experts who promote sexual health try to define the role of education as something essential in the construction of a culture on these issues, starting with certain population groups, such as children and young people, and where the objective is to understand that the human sexual act is an inherent aspect of every individual, which allows them to understand and accept that this is something healthy, which causes happiness and satisfaction with themselves and with others, contributes to solving problems related to sexuality, due to the prejudices and double entendre comments that are usually made.

However, talking about sexuality education from an integral perspective should be understood as a "process based on human rights and a gender perspective, with information to make responsible decisions, without prejudice or guilt; with biological, emotional, social and cultural content, in addition to ethical principles" (Tapia, 2017, p. 2). In other words, sexuality education is not only analysed from a single perspective and in an informative manner, but also strengthens the idea of forming citizens, capable of influencing, transforming and improving their context, allowing them to develop personally and professionally in a full and conscious manner; and where sexuality forms part of this framework.

Talking about sexuality with children, adolescents and young people must also be understood from the family and cultural context of upbringing, understanding that this is part of our life, inherent to us, that we are sexual beings by nature, that there are diverse ways of expressing, communicating and feeling, also implies assuming that both men and women are different both physically and emotionally and that in this sense there will be a great diversity of ways of thinking and exercising this sexuality from its three dimensions: reproductive, pleasurable and relational.

In Mexico and in the world it is still a pending task to consolidate sex education from a comprehensive perspective, even though there are policies, strategies and various actions for its implementation, there is still much to be done, according to UNESCO (2014, p. 1) there are "very few people receive adequate preparation for their sexual life, making them potentially vulnerable to coercion, abuse and sexual exploitation, unplanned pregnancy and Sexually Transmitted Infections (STIs), including HIV", without doubt these are serious problems that remain in force especially in contexts of marginalisation and poverty.

The COVID-19 pandemic highlighted the profound inequalities in various aspects of population groups, such as education, health and access to technology, and above all in the economic sphere. In the area of sexuality, according to Breña (2021), this situation has increased teenage pregnancies; in this context, Mexico occupies one of the first places with high rates of teenage pregnancies. It is estimated that out of every 1000 pregnancies around 7.3 % correspond to young mothers between 15 and 19 years old. And in many cases even younger.

Since 2015, the federal government has been tackling this problem and it is estimated that from the beginning of the pandemic until today, the total number of teenage pregnancies will amount to 191,948, an increase of approximately 12 % of what was expected.

According to the National Population Council (CONAPO), it has made calculations taking into consideration the problems that arise in access to contraceptive and hospital services during the pandemic, for example, consultations have been notably reduced due to fear of contagion, which leads to an increase in unwanted pregnancies, If we add to this the real problems that exist, such as Sexually Transmitted Diseases (STDs), easy access to abortion and the lack of access to health services for prevention, together with the social and economic problems that society in general is going through, this makes the situation even more complex.

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In Mexico, the average age at which sexual relations begin is relatively low in many areas of the Republic, and the lack of sex education, especially in rural regions and sectors of the population that consider it unsuitable for dissemination among children and adolescents, has an impact on the number of pregnant adolescents. This is without considering those situations in which sexual violence, which accounts for 10% of such pregnancies, cannot be prevented through education.

In view of this situation, comprehensive and scientific sex education is required, with sufficient information for the whole community to understand its importance in the development of everyone, as well as the problems that it unleashes. From the reproductive dimension, contraceptive methods, risks and diseases must be known, and respect and responsibility must be promoted, always within the framework of human rights.

Sigmund Freud, the father of psychoanalysis, raised controversy by addressing the issue of sexual manifestations and desires in very young children, and it is certainly a reality that is experienced in all areas, both in the family and in society, as he stated that sexual desire is always present. It has always been necessary to show affection through touching, being intimate, hugging and this will continue to happen until the day our life ends because humans need affection, not necessarily sexual affection, depending on who it is with.

In this context, it is very important that educational institutions at all levels provide training on sexuality that allows all individuals to have a healthy sexual life free of prejudices and to make their own decisions, aware of the implications for themselves and for others.

In the specific context of the north coast region of the state of Nayarit and the Academic Unit of the North of the State of Nayarit (UANEN) belonging to the Autonomous University of Nayarit (UAN), there is an absence of indicators that allow for the identification of the degree of integration of sexual education as part of the integral formation of students and even of statistics that allow for the precise identification of the number of pregnant students.

In this sense, carrying out this study is very important because it sets a precedent for the development of proposals and the definition of strategies for the promotion of sexuality education at the university level. According to the National Population Council (CONAPO), it has made calculations taking into consideration the problems that arise in access to contraceptive and hospital services during the pandemic, for example, consultations have been notably reduced due to fear of contagion, which leads to an increase in unwanted pregnancies, If we add to this the real problems that exist, such as Sexually Transmitted Diseases (STDs), easy access to abortion and the lack of access to health services for prevention, together with the social and economic problems that society in general is going through, this makes the situation even more complex.

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Problematic situation

According to Siderac (2015), recognising the importance of the subject of sex education allows us to understand it and modify the reality in which we find ourselves and show progress in relation to it, because the ideal behaviour of all people should be in a healthy and natural way, as part of the complement of happiness with the individual and with others.

Men and women express and feel their sexuality in different ways. In the case of boys and girls, it is often questioned why they should know about it, leaving aside the fact that through this aspect they develop their own personality and their social relations with affection and security; it contributes to the management of their emotions, pressure from their friends and peers, as well as protecting themselves against sexual abuse.

In the case of university spaces, it is a subject with little or no dissemination within the university community, and only occurs unless it is a specific aspect within professional training, as in the case of health careers, which have formally incorporated it into the study plans and programmes.

In the case of the Autonomous University of Nayarit (UAN), the approach to sexuality education at the institutional level is carried out through an institutional programme called Healthy University, which, as part of its work axes, takes up this important aspect of training, in addition to offering workshops and holding conferences inside and outside university spaces, but there is undoubtedly much to be done from an integral perspective.

It is interesting to question why there is resistance to including sex education or why there are few activities related to it. In this context, María (2009 cited by Siderac, 2015) considers that there are three main beliefs or assumptions that come from very conservative people who are related to the patriarchy:

- The first of these is that there are only two sexes: male and female, and without being able to question these beliefs, and obviously based on heterosexuality. Anything outside of this is considered perverse, sick or deviant.

- The second belief is that sexual relations are performed for the sole purpose of procreation, forgetting about pleasure altogether, and are not even discussed. Whoever addresses the subject will be as perverse and sick as anyone who dares to question this creation.

- The third assumption or belief is related to the family, it is said that the family is the basic cell of society, i.e., how it is formed. This family, according to the author, is the one that rests and is supported by the two previous beliefs, i.e., the male and female gender as parents, and sexual relations with the sole purpose of procreation.

In contrast to these beliefs, it is known beforehand that nowadays sexuality is lived in a very freeway, and that two ways of seeing it coexist, on the one hand, what really happens, as well as its diverse expressions, and on the other hand, conservative beliefs. However, it is considered important to address sexuality so that children, adolescents and young people can live it naturally and in a healthy way, understanding and opening their minds to everything that really exists and implies living from a holistic perspective.

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On the other hand, Butler (2013 cited by Siderac, 2015) refers that in this challenge it will be very important to discuss the different beliefs with which we are formed and educated. And perhaps one of the challenges is to address sexual dimorphism, understanding it as the variations in the external physiognomy of men and women, which has given rise to various interpretations and movements from the perspective of sexuality.

This will be a very difficult challenge that will have to be done with the participation of all those involved as a whole; it requires analysing and thinking about what has previously been excessively forbidden and denaturalised sex itself. This is where educational institutions have a great task to do at all levels of education.

Background

Preinfalk (2016) carried out an exploratory study related to approaches to sex education in public universities in Costa Rica, finding that universities recognise the importance of sex education and implement actions in line with the subject.

On the other hand, Escalera and Amador (2021) carried out a study of knowledge of actions for the prevention and reporting of sexual harassment among social work students, in which they describe the mechanisms and actions that have been implemented by various institutions to prevent and intervene in gender-based violence and for which they considered good sex education to be important.

Undoubtedly, there is a close relationship between having training in sexual education and the phenomena of desertion, lag and abandonment that occur in educational institutions, which is why it is important to create scenarios and conditions to avoid this type of situation and improve the quality of life of students.

Description of the study

Based on the above, the objective of this study is to identify and analyse the knowledge and importance of sex education for students at the Academic Unit of the North of the State of Nayarit, in order to propose strategies to help reduce the number of unwanted pregnancies and sexually transmitted diseases, which have an impact on school dropout and school failure.

This research work was carried out with all the students of the Academic Unit of the North of the State of Nayarit in the Bachelor's Degrees of Law, Accounting, Education Sciences and Administration currently offered. It is a quantitative and exploratory study, a google form was elaborated and applied and the link was sent to the students. The time given to respond was one week.

The survey was taken and adapted from a study conducted by Doris L.B, Dzib M. R.C.H, H.R.C and Dzib, M.S.P in 2016 related to sex education. Once the responses were collected, the information was concentrated, analysed, graphed and interpreted, which allowed for some recommendations to be made for implementation in the academic unit in question.

In order to collect the information, the total enrolment of 804 students was considered, distributed among the Bachelor's Degrees in Accounting, Administration, Education Sciences and Law; however, only 247 responses were received, representing 31% of the total target population.

The data collection technique used was a survey adapted through a google form that was sent to all groups of students at UANEN. It is important to mention that the survey is anonymous so as not to compromise or intimidate the students and to ensure that the responses are objective.

Results and discussions

Once the information has been concentrated on the basis of the responses obtained, data of utmost importance are shown and interpreted in order to design targeted strategies for the student population of the academic unit.

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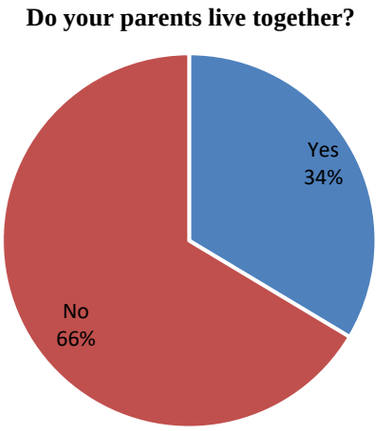
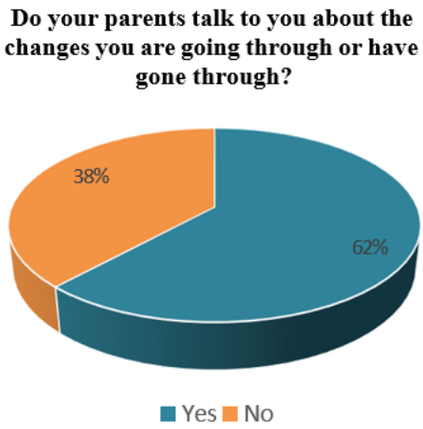
The first question is related to family characteristics, they were asked if their parents live together, 66% of respondents said yes, while 33% did not, this data is an important factor as it allows us to analyse whether this situation mediates the knowledge of sexuality education in university students (see Graphic 1).



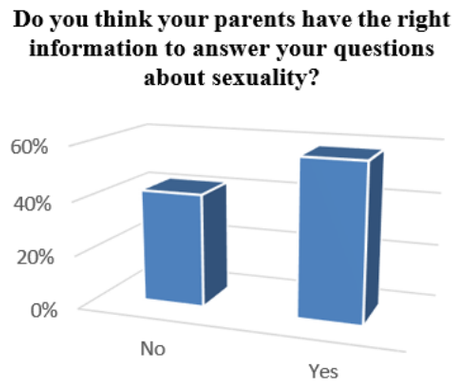
Graphic 1 Coexistence of parents
Source: Own elaboration

Something important for the development of young students is family upbringing, where communication is one of the most important pillars, so when respondents were asked if their parents talk to them about changes in their sexuality, 62% said they did, but 38% said they did not, which could be a factor that increases the problems related to this issue (see graphic 2).



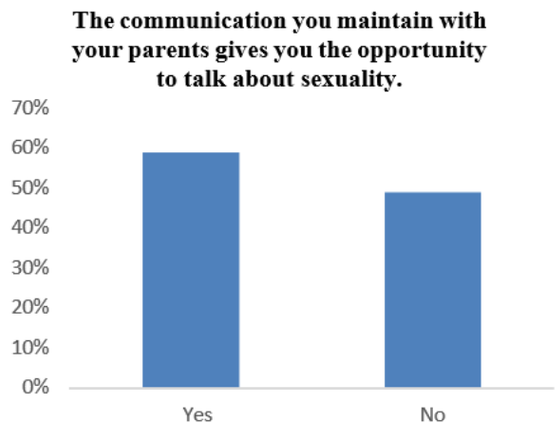
Graphic 2 Communication with parents
Source: Own elaboration

The importance of communication on sexuality issues can be seen as a strategy for prevention, so students were asked if they consider that their parents have relevant information to answer their questions, 58% answered yes, and 42% said no, which could be a cause for concern in the area due to the increase of unwanted pregnancies among students in the academic unit (see graphic 3).



Graphic 3 Communication with parents
Source: Own elaboration

In the same vein, they were asked whether the communication they have with their parents provides an opportunity to discuss these issues, 59% said yes and 41% said no (see graphic 4).



Graphic 4 Confidence in the family
Source: Own elaboration

Misinformation on this topic is one of the main reasons why many young people suffer the consequences. In question five related to the importance of parents at home in providing guidance on sexuality education, 88% responded that it is of great importance because the family is the primary source on these issues, while 12% said it is not (see graphic 5).

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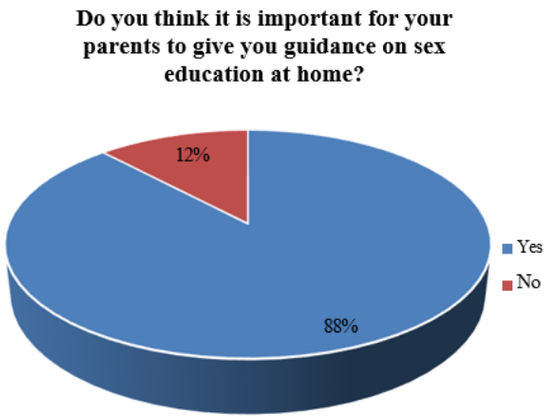
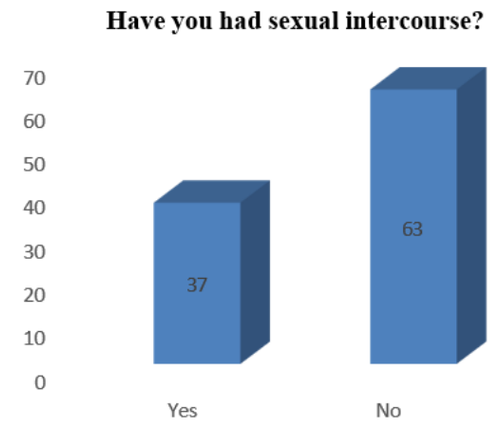


Graphic 5 Sexual orientation
Source: Own elaboration

This information is correlated with the two previous questions, because although the students consider it important for parents to provide this type of guidance, 42% consider that they do not have the relevant information to be able to provide it, but also a similar percentage of students perceive that they are not given the opportunity to address this type of topic.

Question six regarding whether they have had sexual relations, 62.7 % gave a positive answer, while 37.3 % said they had not. It is important to mention that even with these results, the majority of students are inclined to want to have information about sexuality and in this sense, it is considered important that they are informed so that they have the opportunity to make decisions about how to live and enjoy it freely.



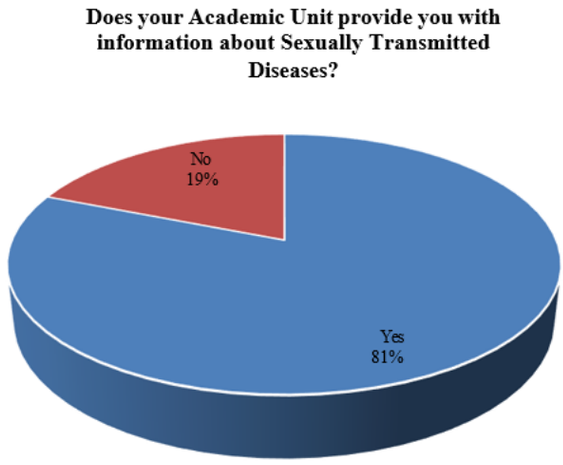
Graphic 6 Sexual relations
Source: Own elaboration

In question seven, students were asked about their knowledge of STDs, 99% were aware of the risk of being sexually active and only 1% responded that they were not.

In relation to question eight, which was an open-ended question, the students stated that they were aware of several sexually transmitted diseases, the main ones mentioned being:

- AIDS
- herpes
- gonorrhoea
- syphilis
- chlamydia
- Papiloma humano virus

Prevention is an important factor in health care and in the case of STDs it is essential that, in addition to the information that is available, the respective care is put into practice; related to the above, they were asked about the knowledge they have on this subject to avoid contagion, 95% mentioned having information about it and only 5% did not (see graphic 7).



Graphic 7 Preventive care
Source: Own elaboration

Question ten related to the importance of disseminating information about the risks to which they are exposed when having sexual relations, 100% are aware of this problem.

Since the school is a place where, in addition to professional training, it becomes a space for socialisation, coexistence and formalisation of relationships between students in the community, they were asked if their academic unit provides them with information related to STDs. 81% said no and only 19% said yes (see graphic 8).

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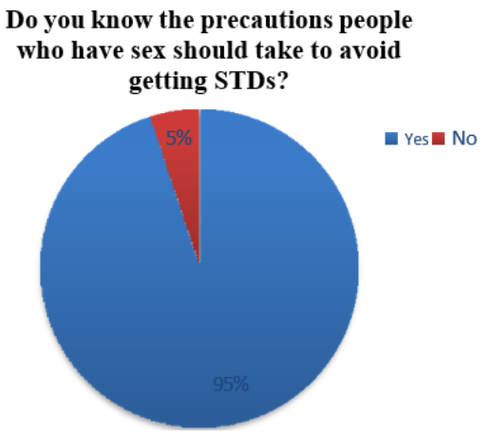

Graphic 8 Information in the Academic Unit
Source: Own elaboration

As this is a topic that is not addressed in the academic unit, 92.5% of the students said that they would like their school to provide them with information on sexuality as an important aspect of their integral formation, while only 7.5% responded that it did not.

Undoubtedly, university spaces as training centres are ideal for the socialisation and dissemination of this topic that is so important for the lives of the subjects, which is why the need to address this as part of their training process is evident.

Conclusions

The subject of sexuality is difficult and complex in different cultures, given the social prejudices that have prevailed in our society over time; however, little by little they have been opening up to the subject and seeing it as a natural aspect of life, something with which one is born and feels the need for attachment and affection through sexual contact.

Based on the results obtained, it can be concluded that the majority of individual university students do have knowledge of sexuality, even though it is not a subject that is expressed openly with their parents, not only because it is considered that they do not have the necessary information to be able to provide guidance, but also because the source of information is diverse.

Likewise, sex education is a topic that is not addressed within the Academic Unit of the North of the State of Nayarit, the respondents consider it necessary and important to be informed about it, so that related problems can be reduced and above all as a strategy for the prevention of STDs, unwanted pregnancies and sexual violence in any of its manifestations.

- Fernández (2011) also states that good sexual information can prevent unwanted pregnancies and diseases that put young students at risk in all universities and in this case in the Unidad Académica del Norte del Estado de Nayarit; Although there is no certainty that the lack of information is the trigger for this fact, it is important to take into account and promote healthy sexual education. It should not be forgotten that Mexico is the country with the highest number of unwanted pregnancies according to statistics from the National Population Council (CONAPO), which is why it is essential and highly relevant to take decisions and actions.

- In this sense and given the importance of sex education in today's world, we propose a series of actions and strategies to be implemented in the academic unit that will benefit students and society in general.

The following actions are recommended:

- Implementation of monthly workshops where information on sexuality is provided and students can express doubts and concerns about contraceptive methods, sex itself, sexually transmitted diseases, i.e., everything that is required for them to understand and live their sexuality responsibly and fully.

- Carry out campaigns to raise awareness of the risks of contracting sexually transmitted diseases, in collaboration with personnel from the Municipal Health Department.

- Seek links with health institutions in the region to jointly promote sexual health within and outside the university community.

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- Establish participation agreements with the Acaponetense Women's Institute to carry out informative activities on sexual education, talks, among others.

- Establish collaboration agreements between UANEN and different health institutions, such as the Mexican Institute of Social Security, the Ministry of Health, the Institute of Security and Social Services for State Workers, the Acaponetense Women's Institute, among others, in order to be able to carry out:

    - Monthly workshops where information on sexuality is provided and students can express their doubts and concerns about contraceptive methods, sexually transmitted diseases and related issues.

    - Awareness campaigns on the consequences of not being responsible in the exercise of sexuality.

    - Respect for sexual diversity

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The role of feedback in decision making learning in Psychology: critical thinking and flexibility

El papel de la retroalimentación en la formación para la toma de decisiones en Psicología: pensamiento crítico y flexibilidad

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Abstract

Higher education aim is to give students skills for flexible and critical decision making in the face of changing situations and contexts. To foster them, we use the Strategic Analysis for Scientific Texts Model, (SAStxt), an instructional tool that provides them with problem solving skills and guides them to identify and comprehend conventional components of texts. Specific feedback to SAStxt performance has proven effective in helping students improve their skills, but it implies high costs in time and effort. As an alternative, generic feedback was designed, based on the structure of the expected responses. Its effectiveness over the performance of 11 advanced students of Psychology major was assessed. To that aim, a curricular course incorporated a baseline assessment and 5 exercises with SAStxt. Students either received specific feedback first and then the generic one, or in reverse order. The mean scores on each exercise and the proportion of correct responses as a function of type of feedback were analyzed. Data suggest that generic and specific feedback have equivalent effectiveness at least with advanced students. This contribution may diminish obstacles university teachers find in giving feedback to massive classes on their critical skills.

Feedback, Strategic text analysis, Methodological and Conceptual skills

Resumen

La educación superior debe formar habilidades para tomar decisiones frente a situaciones y contextos cambiantes con flexibilidad y perspectiva crítica. Para ello, contamos con el Modelo de Análisis Estratégico de textos (MAEtxt), herramienta instruccional que guía la identificación y comprensión de componentes convencionales de textos, así como el planteamiento y solución de problemas. La retroalimentación específica al desempeño en el MAEtxt había sido altamente efectiva para promover mejoras, pero es costosa en tiempo y esfuerzo. Como alternativa, se diseñó una retroalimentación genérica basada en la estructura de la respuesta esperada y se evaluó su efecto sobre el desempeño de un grupo de 11 estudiantes avanzados de licenciatura en Psicología. En un curso curricular, se incorporaron una evaluación diagnóstica y 5 ejercicios con el MAEtxt. La mitad del grupo recibió primero retroalimentación específica y luego genérica, mientras la otra mitad las recibía en orden inverso. Se analizó el puntaje promedio en cada análisis y la proporción de respuestas correctas frente a cada tipo de retroalimentación. Los datos sugieren que específica y genérica son equivalentes en efectividad, al menos con estudiantes avanzados. Esta contribución permitirá disminuir las dificultades de los docentes para retroalimentar la ejecución de habilidades críticas en aulas masivas universitarias.

Retroalimentación, Análisis estratégico de textos, Habilidades metodológicas y Conceptuales

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Introduction

Critical thinking has been pointed out as a very relevant formative objective at various educational levels, since its relevance for autonomous, responsible and information-based decision making is assumed. It is considered a desirable element and one that brings great advantages for performance in academic contexts (Huicochea & Rubio, 2018), in corporate and employment environments (D2L, 2019), for citizen participation (Freixa i Baqué, 2011) and even for environmental conservation and global sustainability (Vendrell & Rodríguez, 2020). This is why it is included in international recommendations for higher education (UNESCO, 2009; WEF, 2015; 2016).

At the higher level, most educational institutions mention among their purposes to train their students in critical skills, but it is often unclear how they define them and how they propose to materialize those objectives (Ellerton, 2015; Picón & Peñaloza, 2022; Vendrell & Rodríguez, 2020). A useful proposal is to define it in terms of skills, as do Michael Scriven and Richard Paul (2003), who call critical thinking the process of conceptualizing, analyzing, synthesizing, applying and/or evaluating information gathered through observation, experience, reasoning, feedback or communication. A complementary and more detailed approach is that of Levy (1997), who defines it as the ability to recognize the difference between facts and theories, making one's own decisions based on factual accuracy and logical consistency. The author describes that this requires the ability to objectively collect, weigh and synthesize information and make reasonable inferences, judgments and conclusions, identify and question underlying assumptions and beliefs, discern hidden or implicit values, perceive similarities and differences between phenomena, understand causal relationships, reduce logical problems and personal biases, avoid over-simplifications and over-generalizations, explore alternative perspectives and seek creative solutions. All this under an attitude of tolerance to uncertainty and ambiguity, so it is also recognized that it includes a component of socioemotional skills (Luna, 2022).

In the context of specific training in Psychology, and in harmony with international (APA, 2013), national (LGES, 2021) and institutional (Faculty of Psychology, 2008) standards, work has been done for three decades on the definition, teaching and development of professional skills that allow students to examine, evaluate and understand events, solve problems, and make decisions based on sound reasoning and valid evidence, consolidating what has been named the Methodological and Conceptual Skills Model or HMC (Santoyo, 2021). This model, its implications and instructional tools such as the Model of Strategic Text Analysis (MAEtxt), are closely related to the definition of critical thinking skills previously mentioned, since it highlights the importance of students being able not only to paraphrase information and replicate procedures, but also to critically evaluate the information received, identify their basic assumptions, evaluate the internal and external validity of their own and others' arguments and conclusions, and be able to propose alternative courses of action. To this end, it recognizes the need to generate learning situations that induce them to identify and solve problems through actions such as deducing, relating, evaluating and creating, at all educational levels (Capcha & Tipula, 2022; Mejías, 2022; Quispe, 2022; Santoyo & Colmenares, 2016). All this, under the conviction that training in skills of this type, transversal to disciplinary content and applicable in different contexts, contributes to the cognitive flexibility of students (Ionescu, 2012), to their ability to generate creative solutions to various problems, and to their competence to adjust to the changing challenges posed by academic life (Kercood, Lineweaver, Frank & Fromm, 2017) and that will later be demanded by working life (Nägele & Stalder, 2017).

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In the educational context, typically, efforts have been made to assess critical thinking through instruments (López, Martínez & Sierra, 2017; Ossa-Cornejo et al, 2017), in which the perception about one's own skills is evaluated, or in the best case, hypothetical situations are presented in which one can respond by exercising the skills. However, these efforts are usually outside the real context of the tasks and content to be covered curricularly, and therefore have low ecological validity. On the contrary, the MAEtxt is designed to focus on the skills specifically required for the behavioral sciences, just those that are intended to be established during academic training and modeled in daily teaching practice, in addition to being represented in the skills that are socially expected of professionals in these disciplines (Santoyo, 2021), which implies a high relevance with the contents and allows a link between the practice of the skills and their evaluation. The MAEtxt is a tool that guides the learner to perform an exercise of analysis and generation of arguments from the texts that are curricularly programmed in the classes, so that students can perform these activities of deduction, relation, evaluation and creative generation of alternatives on the raw material that the same discipline has considered relevant to form the graduate profile. Thus, the progressive change in that argumentation that they generate becomes an object of study and a space for the practice of critical thinking (Colmenares & Santoyo, 2021; Huicochea & Rubio, 2018). Several studies have shown its usefulness for this, both at different levels of professional training (Espinosa, Santoyo & Colmenares, 2010) and in different institutions and different behavioral sciences (Bazán, García & Borbón, 2005; Cepeda, López & Hickman, 2021).

An indispensable element to promote such progressive change is the feedback that students receive from their performance. This element is often overlooked in many educational interventions, but it is essential, as will be seen in the following section.

Feedback

In technical terms, feedback is the information that we receive as a consequence of our own performance (Hattie & Timperley, 2007) and that can include aspects such as the relevance, comprehensiveness or adjustment to the criterion of our behavior, or complementary aspects such as alternative ideas, elements that had not been contemplated, what the performance lacked to reach the criterion or to have another type of result, etc. And all this is done to influence, reinforce and modify behaviors and concepts in the learners (Sarkany & Deitte, 2017). In the context of MAEtxt, we have sought to systematize feedback, in order to identify which elements are most useful to provoke the expected changes. The effectiveness of specific and personalized feedback has been tested, where the criteria achieved are exhaustively pointed out, the rule is reiterated to induce future responses that reach the criteria that have not yet been achieved, and the direction in which progress can be made to continuously improve is oriented (Colmenares, Espinosa, Morales & Santoyo, 2010; Santoyo, Colmenares & Morales, 2010). However, this type of feedback is highly costly for teachers in terms of work and time dedicated, which makes it not very viable in massive groups of public universities where it is necessary to evaluate and provide feedback to 60 or 80 people in each scheduled exercise. And alternatives such as general group feedback, according to these same experiences, are of low effectiveness, at least in the case of novice students (first semesters of undergraduate studies).

In an attempt to generate equally efficient but less costly alternatives, we have developed the proposal of a feedback that we have called generic, based on the structure of the response (Santoyo, Ortega & Torres, 2021), which is capable of providing the essential information so that the student can (1) have in advance a model of the expected response and (2) compare his or her performance with a clear and explicit criterion, which in turn will allow him or her to recognize the missing elements to meet the criteria, understand the meaning of the scores and -possibly- guide his or her efforts to achieve the programmed formative goals. All this, without the need to make an exhaustive evaluation of content, forms of writing, and other particularities of the student's open-ended responses.

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The model of strategic analysis of texts

As presented in other works (Santoyo & Colmenares, 2016), the MAEtxt consists of 16 tasks corresponding to categories conventionally contained in behavioral science texts, and whose identification, deduction and analysis allow a deep understanding of the text and a connection of its content with other relevant learning. If we abstract the structure of an expected response for each of the categories, we can obtain a description like the one presented in Table 1.

Category	Expected structure
Theoretical Justification (TJ)	Two elements: (1) the argumentation used by the author to present his theoretical proposal and (2) the limitations of previous studies from which it derives.
Methodological Justification (JM)	Two elements: (1) the argumentation used by the author to present his methodological proposal and (2) the methodological (procedural) limitations of previous studies that gave rise to it.
Social Justification (JS)	Two elements: (1) brief description of a problem of social relevance and (2) the argumentation used by the author or inferred by the reader on how the study would help to address that problem.
Basic Assumptions (SB)	Each assumption is a sentence or premise that accounts for an explanatory argument that we assume to be true on the basis of what is stated in a given theory or model.
Objective (O)	A sentence that indicates what is intended to be achieved in the study and contains two elements: (1) a verb according to the argumentative, evaluation or manipulation procedures carried out and (2) the experimental or argumentative conditions.
Analysis Unit (AU)	A sentence with three elements: (1) the dependent variable(s), (2) the independent variable(s), and (3) the functional relationship between them (one variable depends on the other).
Argumentative Strategy (AS)	A short sentence or paragraph that abstracts and synthesizes the description of the style in which the author presents his/her arguments and results (how he/she presents the information and structure of the writing).
Methodological Strategy (MS)	A short sentence or paragraph that abstracts and synthesizes two elements: (1) the methodological conditions or experimental manipulation carried out and (2) the name of the design employed (or comparisons).
Results (R)	A short sentence or paragraph that abstracts and synthesizes two elements: (1) the main (most important) results obtained in the study according to the manipulation performed and (2) the value that these results represent or support.
Internal Coherence - Argumentation (IQ-A)	A short sentence or paragraph that integrates three elements: (1) a value judgment of the structure of the article and/or the relationship between the sections, (2) the elements of the text that are evaluated, and (3) the valid argument as to why this adds or subtracts validity.
Internal Consistency - Internal Validity (IC-VI)	A short sentence or paragraph that integrates three elements: (1) a value judgment about the effectiveness of the variables or the evaluation of the internal validity of the work in terms of the experimental control conditions, (2) the elements of the text that are evaluated, and (3) the valid argument as to why this adds or subtracts validity.
External Consistency - Generality (EC-G)	A brief sentence or paragraph that integrates three elements: (1) a value judgment regarding the generality of the work, (2) the elements of the text that are evaluated, and (3) the valid argument as to why this adds or subtracts validity.
External Coherence - Relationship to Literature (CE-L)	A short sentence or paragraph that integrates two elements: (1) a value judgment on the consistency with other studies known to the analyst, and (2) the clear and explicit relationship of the results found by the author with the results of those studies.
Author's Conclusions (CA)	A brief sentence or paragraph integrating at least two of three elements: (1) brief description of the author(s)' conclusions (optional), (2) value judgment on the consistency of the conclusions with other sections, and (3) valid argument supporting such evaluation of the author's conclusions as related to the objective.
Own Conclusions (CP)	A sentence or short paragraph that presents a novel argument (that is not in the text) from the integration of different elements and DIFFERENT to the conclusion given by the author.
Alternative Courses of Action (AAC)	A brief sentence or paragraph that integrates two elements: (1) one or several methodological (procedural) and/or argumentative (theoretical) alternatives that overcome the limitations found in the present study, DIFFERENT to those presented in the text and (2) a brief explanation of how these limitations could be overcome.

Table 1 Structure of expected responses for each of the MAEtxt categories
Source: Own elaboration

Grading the response structure is considerably faster than giving specific feedback, and this could be a great technical advance for the generality of the application of this strategy. However, it is necessary to test generic versus specific feedback before proposing it for educational use in mass groups. For that reason, the objective of the present research was to compare the effect of two types of feedback: generic or specific, on the performance of a group of high school students in front of different exercises of strategic text analysis with MAEtxt.

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In the following sections, the method used is described, specifying the operational characteristics of each type of feedback. Subsequently, the results obtained are presented and finally, the relevance of structure-based feedback as a viable educational tool for training in critical thinking and flexibility that allows professionals in training to practice professional decision making is discussed.

Methodology

Participants

A natural group of 11 students enrolled in a curricular subject of the eighth and last semester of the bachelor's degree in Psychology at a public university, 7 women and 4 men, participated.

Instruments

Six actual published scientific articles relevant to the curricular objectives of the subject were used as material for the analysis exercises.

Ev.	Article
Base Line	Watson, J. B., & Rayner, R. (1920). Conditioned emotional reactions. *Journal of Experimental Psychology, 3*(1), 1-14.
Ej. 1	Haney, C., Banks, W. C., & Zimbardo, P. G. (1973). A study of prisoners and guards in a simulated prison. *Naval Research Reviews, 9*, 1-17.
Ej. 2	Seligman, M. E., & Maier, S. F. (1967). Failure to escape traumatic shock. *Journal of experimental psychology, 74*(1), 1.
Ej. 3	Rachlin, H. & Green, L. (1975). Commitment, choice and self- control, *Journal of Experimental Analysis of Behavior, 17*(1), 15-22.
Ej. 4	Ariely, D., & Wertenbroch, K. (2002). Procrastination, deadlines, and performance: Self-control by precommitment, *Psychological Science, 13*(3), 219-224.
Ej. 5	Thomas W. Farmer & Robert B. Cairns. (1991). Social Networks and Social Status in Emotionally Disturbed Children. *Behavioral Disorders, 16*(4), 288- 298.

Table 2 Texts that were analyzed in the different exercises of this instructional experience
Source: Own elaboration.

It is important to note that all the articles included in this experience are in their original language, English, which is different from the students' mother tongue. This is because the course was advanced and a full understanding of the technical texts in a foreign language is expected as a requirement for graduation. When asked, the group did not state that they had had problems with the language, but this is an aspect worth considering when analyzing this experience.

The exercises handled through the online platform asked the student to answer 16 tasks regarding the content of the reading reviewed. Each of these tasks corresponded to the identification, analysis, synthesis or evaluation of one of the 16 categories of the MAEtxt Model of Strategic Text Analysis (Santoyo, 2021).

For the evaluation we worked with a four-point Rubric, which assigns a score of zero to absent answers, 1 point to incorrect or incomplete answers, 2 points to each task that partially fulfills the requirements of the model, and a score of 3 to each answer that satisfactorily fulfills these requirements. Thus, the maximum possible score is 48 points, and the minimum expected to establish a basic mastery of the skills would be 32 points.

Procedure

At the beginning of the course, and after explaining the relevance of strategic text analysis skills for the professional practice of psychology, a first exercise was carried out to serve as a baseline and to establish a reference point for each student, with James Watson's classic article from 1920. After the first application, a broad presentation on the Text Analysis Model was made using the first reading as an example. The teacher proposed several possible correct answers for each category, which, without being textual or identical to each other, would meet the expected criteria, while explicit doubts of the students were resolved. Subsequently, an exercise was assigned every three weeks, during which the text and questions were available for five days for consultation and resolution.

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The group was aware that the readings were an essential part of the class, and that they represented topics that would be reviewed and discussed with the professor in charge, as well as the weight that the delivery of the analysis exercises would have on the final grade (40%). After each submission, each student received a response to his or her analysis, corresponding to the programmed feedback and the absolute score obtained. This was done by randomly assigning students to one of two groups: the first group would receive generic feedback on their first two analyses, and then receive specific feedback on the next two, ending again with generic. On the other hand, the second group would first receive specific feedback in the first two analyses, then generic for two exercises, and would end with specific.

Considering the objective of the research, the types of feedback were defined as follows:

Generic: The feedback does not depend on the particular characteristics of each response, but on the level of execution and expected structure of the category (see Table 1). It serves the function of modeling the expected structure of the response. The operationalization of how each response received was fed back is presented in Table 3.

Execution Level	Generic feedback
1. The response suggests little understanding of the task, is obvious, circular, textual copy or other category.	The lack of relevance of the response is reported and the expected structure in each category is described.
2. The answer is incomplete, it does not show integration or synthesis, it may still include some textual elements.	The partial relevance of your response is reported and the expected structure for the elements that remain to be developed is described. No reference is made to the textual or the need for integration.
3. The response includes all the expected elements and the appropriate content (with proper words) of the category, even if it has structural errors such as clutter or unnecessary length.	The correct execution in the category is indicated.

Table 3 Form of generic feedback for each level of execution in MAEtxt
Source: Own elaboration

Specific: The feedback responds differentially to particular student responses. It is a function of the configuration (structure and content) embodied in the student's response in each category and contains three aspects: (1) an acknowledgement of the appropriate elements of the student's response, (2) a pointing out of those missing or mismatched elements of the response, and (3) some brief recommendations for improving the student's response. The general characteristics of the feedback are presented in Table 4.

Execution Level	Specific feedback
1. The response suggests little understanding of the task, is obvious, circular, textual copy or other category.	It includes a description of the category, an invitation to construct your response without repeating textual information, and points out particular aspects to which you should pay attention in order for your response to meet the criterion.
2. The answer is incomplete, it does not show integration or synthesis, it may still include some textual elements.	The relevance of the elements and arguments that are presented, what is missing from the structure of the answers, and what is present but not relevant given the same structure are mentioned. Suggestions for constructing the response with the reader's own language or the invitation to critically reflect on the text can be included in the evaluation categories.
3. The response includes all the expected elements and the appropriate content (with proper words) of the category, even if it has structural errors such as clutter or unnecessary length.	The achievement of each criterion is explicitly recognized. Suggestions for improving the synthesis, integration and coherent order of ideas may be included.

Table 4 Form of the specific feedback for each level of execution in the MAEtxt
Source: Own elaboration

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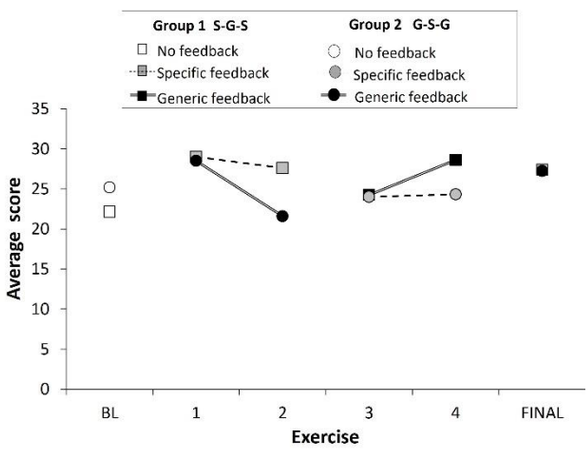
Thus, each exercise received feedback for each of the MAEtxt responses, in addition to the score per response and the total sum. Additionally, throughout the school year, the categories were elements present in the development of group discussions on the items in class, with the aim of clarifying their meanings and applications. Specific doubts were also solved and examples were given according to the students' requests.

Results

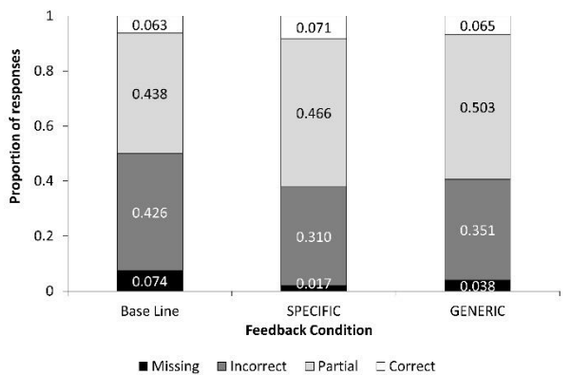
Figure 1 shows the average score of each of the groups throughout the instructional experience. In the points that are represented without filler, which represent the diagnostic measure or baseline, it can be observed that the groups begin the experience with similar scores, below the criterion. Although the central tendency is similar, the dispersions in this diagnostic measure are wide, especially in the case of group 1 (Group 1: *M*=22.167, *SD*=8.20; Group 2: *M*= 25.2; *SD*= 2.77). In the last measurement, both the group that started with generic feedback and the group that started with specific feedback showed almost identical scores, and higher than the initial ones, and with equivalent dispersions (Group 1: M=27.4, SD=2.97; Group 2: M= 27.25; *SD*= 2.87).



Graphic 1 Average score of the group in each of the exercises of the instructional experience
Source: Own elaboration

There is variability between the scores in each of the exercises, although there is a similar trend in that both groups benefit from receiving the first feedback and perform better in exercise 1, although the gain of the group receiving specific feedback is greater. From exercise 1 to 2, both groups perform lower, although those receiving generic feedback decreased their average score more. In exercise 3, both groups changed the type of feedback received, and the effect is maintained: Group 1, which at this point received generic feedback, had even lower scores than in the previous exercise, while group 2, which started receiving specific feedback, improved its scores. For the next exercise group 1 recovered its score, and group 2 continued to improve, but to a very small extent. For the final exercise, when both groups received back the type of feedback they started with, group 1, which returned to specific feedback, lost some of its progress and group 2, which returned to generic feedback, had an improvement of almost 4 points on average.

This analysis of average scores suggests that both types of feedback improve performance, and that specific feedback may be more effective by a small margin. However, it may be useful to compare the proportion of correct, partial, incorrect, or missing responses as a function of each of the conditions. This is shown in Graphic 2.



Graphic 2 Proportion of responses under each of the feedback conditions
Source: Own elaboration

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As can be seen in Figure 2, both types of feedback cause a difference with respect to the baseline: the proportion of absent and incorrect responses decreases, the proportion of partially correct responses increases, and the proportion of responses that satisfy the criterion increases, the latter especially in the case of specific feedback. Additionally, the data suggest that specific feedback is indeed more effective in decreasing missing and incorrect responses, and in increasing the number of fully satisfactory responses, although the difference between the two types of feedback is actually very small.

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Conclusions

In this study, the systematic monitoring of a real and situated educational experience was carried out to compare the effect of generic feedback versus specific feedback, on the performance of a group of undergraduate students against six exercises of strategic text analysis with MAEtxt.

In general, the results of the initial measurement coincide with previous studies that indicate that, without explicit help, undergraduate students are not very effective in reading comprehension (Flores-Macías, 2021; Santoyo, 2001). However, from the HMC model, the aim is not only to promote a better comprehension of what is read, but also to contribute to the exercise of complex thinking skills. At the professional level, it is not necessary to consult texts to store knowledge in memory, but to make decisions about them: to decide whether they can be considered as references, whether they should be criticized, whether the ideas expressed could be replicated, whether their findings require or could be expanded, etc., and this should be done from a critical, flexible and constructive perspective. Thus, the MAEtxt was designed so that, during higher education, there are opportunities to practice this decision making.

We start from the evidence that explicit training in these skills is effective in improving performance in the management of scientific information contained in the readings that are typically reviewed during a course at the undergraduate level (Santoyo, Ortega, Torres & Colmenares, 2017). The present results add to the evidence supporting the effectiveness of MAEtxt and its generalizability across subjects, levels of study, and among different related disciplines.

We also had precedents suggesting that personalized and specific feedback is highly effective in guiding students in improving their skills of identification, analysis, deduction, synthesis, and evaluation of text elements (Colmenares et al, 2010). However, we have also confirmed through experience the impossibility of maintaining such detailed feedback when dealing with massive groups in which the formative purposes of the class merit, for example, the discussion of one reading per week. This demand increases the workload for teachers to unmanageable levels. The present effort is part of the search for alternatives that make it possible to evaluate student progress, give them useful information that allows them to adjust their answers, and verify if there is indeed an effect of such feedback, without the need to invest a great deal of time in each of the answers per student.

The study reported here was conducted with a small group of advanced Psychology students. The number of participating students made specific feedback possible, which would otherwise be highly complicated. And the advanced level made it possible to compare the results with other previous studies conducted with students in the first semesters of the course, in which non-specific feedback presented low effectiveness (Colmenares et al, 2010). In the present experience, the two types of feedback were equally effective, increasing the quality of the responses and the average scores in very similar proportions. Possibly the difference in results between the two experiences is related to the level of advancement in professional training, since it would be logical that disciplinary knowledge provides more elements with which students can analyze the reading material.

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The other mechanism that could explain the difference is that the feedback that in this work was called "generic" is much more systematic than the general feedback used in 2010. As described in the method section, this feedback may not be fully personalized, but it does respond directly to the way students respond, and provides relevant information about the criteria to be met. It is possible that students with more disciplinary elements, as is the case of the group that participated in this experience, when supported by feedback based on the structure of the expected response, may be able to derive the rule successfully and apply it effectively to various tasks.

On the other hand, for future research it would be worth considering the language barrier as an additional element in the task. It is relevant to identify whether the fact that the readings are in a non-native language, although familiar to the students, represents a difficulty in the comprehension and handling of the information. Rather than treating it as a possible extraneous variable, it would be valuable to place this as an object of research interest and look for the mechanisms through which the students face and resolve this situation in order to try to respond to the exercises.

The analysis of the sequence of progress from one exercise to the next is relevant because the students have in each exercise a practice opportunity that increases their experience with MAEtxt, but it is important to emphasize that each new exercise implies a process of transferring skills to a new task with a new text whose characteristics change naturally. It is to be expected that the texts represent differential difficulties, depending on their structure, length, the type of argumentative strategy, etc. Therefore, a result such as the present one, where progress is not constant and progressive under any of the feedback conditions, is to be expected and typical according to previous studies (Santoyo, 2021). Additionally, it is important to call attention to the fact that an overall effect of the two groups is being presented for the moment, through descriptive measures of central tendency, but it should be remembered that averages can hide individual differences that are usually wide in this type of exercises (Colmenares & Santoyo, 2021).

It will be important in future studies to find ways to identify differential profiles and trajectories that allow us to assess specific strengths and areas of opportunity for particular students.

The present work suggests that generic feedback based on the structure of the expected response can be as effective as detailed and personalized feedback to improve skills, although it also confirms the finding that 5 exercises are not enough to achieve educationally expected improvements, since at the end of the experience a score that met the satisfactory criteria in the 16 categories of the MAEtxt had not yet been achieved. This reiterates a "ceiling effect" that we have not managed to break (Colmenares & Santoyo, 2021; Espinosa et al, 2010; Santoyo & Colmenares, 2016) and that possibly needs more intensive or lasting interventions, in order to be achieved. Ideally, in fact, this type of experience should not be restricted to one semester or one subject, but throughout the entire professional training there should be this type of exercises, appropriate to the contents of each level, and that would allow a consistent practice of methodological, conceptual and professional skills that accompany the development of critical thinking and flexibility in the face of novel situations. This would surely result in professionals who are better prepared for the challenges of a complex reality that requires solutions and proposals to its pressing problems.

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Parental competencies: descriptive study based on the actions of university social responsability

Competencias parentales: estudio descriptivo a partir de las acciones de la responsabilidad social universitaria

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Abstract

Family is the main transmitter of knowledge, values and attitudes. In this sense, working with them from educational institutions is necessary for the development of learning communities. Therefore, training in parenting competencies is a relevant educational action, considering research shows the importance of developing them in their four dimensions: relational, protective, formative and reflective. This is a quantitative, descriptive, non-experimental cross-sectional research, which aims to identify the profile of parenting competencies from the application of the Positive Parenting Scale instrument E2P V.2, to a convenience sample of 14 participants. The main results indicate that the sample studied is in a risk zone, due to the fact that they exercise their competencies at low frequency levels, highlighting among them the relational competencies. This is relevant because they are fundamental in the affective relationship of parents with their children. The research found and the competency profile obtained show the importance of developing parental training programs focused on strengthening parental competencies; thus favoring children's exploration and learning processes, enhancing their autonomy and the regulation of their behavior.

Parental competencies, Parenting scale, Social responsibility

Resumen

La familia es la principal transmisora de conocimientos, valores y actitudes. En ese sentido, trabajar con ellas desde las instituciones educativas es necesario para el desarrollo de comunidades de aprendizaje. Por lo que, la formación en competencias parentales es una acción educativa relevante, considerando que las investigaciones ponen de manifiesto la importancia de desarrollarlas en sus cuatro dimensiones: vincular, protectora, formativa y reflexiva. Esta es una investigación cuantitativa, descriptiva, no experimental de corte transversal, que tiene como objetivo identificar el perfil de competencias parentales a partir de la aplicación del instrumento Escala de Parentalidad Positiva E2P V.2, a una muestra por conveniencia de 14 participantes. Los principales hallazgos indican que la muestra estudiada se encuentra en zona de riesgo, debido a que ejercen sus competencias en niveles de baja frecuencia, resaltando entre ellas las competencias vinculares. Esto es relevante porque éstas son fundamentales en la relación afectiva de los padres con sus hijos. Las investigaciones encontradas y el perfil de competencias obtenido muestran la importancia de desarrollar programas de formación parental enfocados en fortalecer las competencias parentales; favoreciendo así procesos de exploración y aprendizaje de los niños, potenciando su autonomía y la regulación de su comportamiento.

Competencias parentales, Escala parentalidad, Responsabilidad social

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Introduction

During the crisis caused by COVID-19, the institutions of the educational system were sustained by the reorganization of the teacher's role, the student's capacity for self-organization and family support; each one responding according to their capacity and possibilities (Bárcena, 2021). This context posed great challenges related to the various vulnerable scenarios where there was no family support; either because they did not have the tools to support the learning process; because the family had to prioritize their (economic) activities; or because of the lack of access to technological resources that would allow effective communication between family and school (Hurtado, 2020).

Therefore, working with families becomes a necessary aspect for the development of learning communities within institutions, in the search to generate a collaborative network in which it is possible to share responsibility for the learning and development of students (Vielma, 2020). From this perspective, the training of parents becomes an educational action that seeks awareness, employing their skills and competencies to improve the well-being, learning and academic outcomes of students (Redding, 2019).

Background

The family has been visualized as a transmitter of knowledge that is acquired through traditions that are developed to care for, educate and promote their socialization (Flórez et al., 2017). As a fundamental cell of society, it exerts an important role in the emotional balance of its members, which has played a relevant role in the face of the repercussions brought by COVID-19, due to the negative effect it has generated on issues such as education and especially health (Tupac et al., 2020).

In this sense, the formation of parental competencies is important, since it has been demonstrated that the involvement of parents in the education of their children contributes to a decrease in absenteeism and increases academic performance, improving behavior in the classroom. In addition, it has a positive effect on teachers, since it allows having a flexible and collaborative dynamic where the well-being of children is jointly seen (Delgado, 2019).

Under this premise, Redding (2019) addresses that working on the training of parents becomes an educational action that seeks awareness, by using their skills and competencies for the development of students. In this way, programs that support the training of families also benefit children's learning, thereby improving their academic results.

Given this approach, Bernal-Ruiz et al. (2021) in an investigation on the influence of parental competencies on attention and cognitive flexibility of schoolchildren, found evidence of a significant influence ($p < .01$) of formative and protective parental competencies on the attention of girls and boys, with an effect size of $\eta 2=.129$ and .115, respectively. Thus, children of parents and caregivers with a low score (in the risk zone) may show difficulties in activities involving attention.

In this tenor, Jami (2019) in a study to analyze the psychometric properties of the Positive Parenting Scale (E2P) applied to an Ecuadorian population (N=332), found that the highest score obtained corresponded to protective competencies (M=55. 43, SD= 7.17), followed by bonding competencies (M=45.98, SD=5.91), formative (M=39.13, SD=5.88) and reflective (M=33.41, SD=5.39).

Additionally, Matteoni (2017) in a descriptive study on the influence of parental employment status on the exercise of positive parenting, found that only 37.8% (n=14) of the surveyed parents (n=37) exercise positive parenting optimally, in contrast to 62.2% (23) who do so below that zone (37.8% (n=14) monitoring zone and 24.4% (n=9) risk zone.

Similar results were found by Vera (2021), who found that more than 50% of mothers and fathers (n=8) have difficulty in exercising their competencies, by placing their responses in a low frequency zone: 63% for bonding, 61% for reflective, 53% for formative and 48% for protective.

In another study by Zurita (2022), it was found that 48.1% showed their parental competencies in monitoring zone, 22.2% in risk zone and 14.8% in optimal zone. Which contrasts with what was found by Pinta and Pozo (2018), where more than 50% of the parents surveyed (n=36), showed formative and reflective competencies in an optimal zone.

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For his part, Eisendecher (2018), when carrying out a support program for parents and caregivers and analyzing parental competencies with the application of the E2P instrument pre and post implementation, found that bonding competencies went from a mean score of 44.8 to 49.6, formative competencies from 36 to 40.8, protective competencies from 51.2 to 57.1 and reflective competencies from 27.8 to 31.5; thus, a positive increase in the score was observed after the intervention.

In this context, the studies demonstrate the importance of designing and implementing programs that contribute to strengthening parental competencies in their four dimensions (bonding, protective, formative and reflective). Allowing families to efficiently develop their responsibilities and contribute to the achievement of expected learning in students, considering that there is a highly positive relationship ($p < 0.01$, 0.815) between parental competencies and academic achievement (Vera, 2021); attention; socio-affective development and; problem-solving skills of children and adolescents.

In addition, studies such as that of Martínez et al. (2020), have shown that children should grow up in environments of acceptance, respect, affection and stimulation for proper physical and mental development. However, there are risk factors that compromise these competencies, such as the absence of significant attachment bonds, conflictive relationships in the environment, parental stress and difficulty in understanding children's needs, which leads to inadequate parenting styles and harmful practices that trigger maltreatment and violence in the family environment (Lara & Quintana, 2022). Hence the importance of addressing and working on parenting skills to reduce the risk of children suffering from psychological disorders that lead to childhood depression, low self-esteem, behavioral problems and aggression, among others (Mascareño, 2021).

In this scenario, the role and responsibility entrusted to universities as promoters of social change and promoters of the common good becomes more relevant. In a context where the university-society binomial must be seen as an interconnected entity, considering that each of its parts affects the other (Ibarra et al., 2020). In this sense, to develop initiatives that respond to the needs of the community from its substantive functions, such as research and liaison, takes on singular relevance, since these will generate links that impact on social development and mutual learning (URSULA, 2019).

As stated by Rodríguez-Villamizar and Amaya-Castellanos (2019) in their study on parenting styles, it is necessary to support mothers, fathers or guardians through accompaniment strategies that give them tools to improve their parenting skills. Through the implementation of strategies that allow them to face parenting problems in a better way; in order to have more positive relationships with their children.

Therefore, in response to the search for sustainable alternative solutions that promote optimal scenarios within the homes where children will develop, it is intended to help families seeking support for the management of family situations that impact on the integral development of their children.

Objective

To identify the profile of parental competencies based on the application of the Positive Parenting Scale E2P V.2.

Research question

What is the profile of parental competencies based on the development of strengthening interventions?

Theoretical references

Parental education and parenting school

Parental education is developed through educational institutions by means of the "school for parents", which is a collective learning space in which problems and possible solutions to situations that may occur in the family are analyzed (Tupac et al., 2020).

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Becoming a participatory strategy for learning and reflection among fathers, mothers, assistants and teachers, which develops autonomy and cooperation, and contributes to the creation of an appropriate climate for the balanced development of children (Gómez & Palomino, 2014). In this sense, parental education refers to the educational action of awareness, learning, training and clarification of the values, attitudes and practices of mothers and fathers in the education of their children, with the purpose of achieving changes in their emotional, family development, social, organizational and theoretical knowledge competencies (Torío-López, 2019).

Parental competencies

Gómez and Contreras (2019) assume that there is no consensus on the definition of parental competencies, their components, processes and the relationship between them and their impact on the development of children. Hence, definitions can be found such as that of Sallés and Ger (2011), who define them as the ability to care for, protect, educate, socialize and respond adequately to the needs of children. Or the definition of Santander (2021), which establishes them as the set of care, attention, skills and abilities that parents possess to raise their children.

Other authors define them more broadly as the set of capacities that allow mothers and fathers to face the task of parenting in a flexible and adaptable manner, according to the evolutionary and educational needs of the children and the standards considered acceptable (Allauca et al., 2021; Wladimir & Sánchez, 2021). For their part, Gómez and Muñoz (2015), recognize them as the appropriation and development of knowledge and skills to guide behavior according to the situation that arises in family life and parenting, from the physical, cognitive, communicative and socioemotional aspects of the children, in order to safeguard their rights and well-being.

Given this diversity of definitions, the present research took as a reference the work and the Parentality Scale E2P V.2 designed by Gómez and Contreras (2019), so parental competencies were defined as the set of knowledge, attitudes and bonding, formative, protective and reflective parenting practices, which allow to flexibly guide behavior in the face of the diversity of family and parenting situations, with the purpose of meeting the needs of children and safeguarding their well-being and the exercise of their rights. Each dimension is described below.

Bonding parental competence

They are oriented to secure attachment and the search for socioemotional development through the family relationship. They favor psychological and emotional connection, regulating stress and suffering, protecting mental health and seeking adequate socioemotional development throughout life (Bernal et al., 2018; Gómez & Contreras, 2019; Pacheco & Osorno, 2021). It is composed of five elements:

a) Observation and sensitive knowledge: paying attention and interpreting signals in the behavior of the children, in order to have the tools to accept their individuality and negotiate conflicts; b) Sensitive interpretation or mentalization: interpretation of behavior (beliefs, feelings, attitudes, desires) based on the reflection of the parental mental experience and that of the children; c) Stress regulation: accompanying, modulating, calming emotional states of stress to guide them to states of balance; d) Emotional warmth: the demonstration of expressions of affection and good treatment and; e) Daily involvement: staying interested, attentive and connected to the children's experiences.

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Formative parental competence

Refers to the structuring of the learning, physical and psychological context to favor the exploration, learning and socialization of the children. It leads the processes that promote them to think for themselves and improve their confidence and self-esteem before the world around them, through the generation of spaces for interaction among the family, where they are recognized as persons and their individuality is respected (Acevedo et al., 2016; Gómez & Contreras, 2019). It is composed of the following elements:

(a) Organization of the experience: structuring a physical and psychic environment appropriate to the age through modeling, mediation dialogue and reflection; (b) Progressive autonomy: making available those physical, material and equipment conditions that stimulate their autonomy according to their age; (c) Mediation of learning: favor exploration and discovery of the world through modeling, mediation, dialogue and reflection; d) Positive discipline: regulate and conduct behavior using anticipation, explanations, example, negotiation and perspective taking through calm and firm attitudes and; e) Socialization: share and model social norms and rules for behavior in public spaces, community values and customs.

Protective parental competence

It focuses on creating conditions for development, reducing or eliminating sources of toxic stress, caring and protecting, safeguarding the needs of daughters and sons and protecting their integrity through guarantees of physical, emotional and psychosexual safety. This competency focuses on needs, rights and human development (Acevedo et al., 2021; Gómez & Contreras, 2019). The components that make up this competency are:

(a) Construction of well-treating contexts: understands the relevance of good treatment using a philosophy of treatment with respect and dignity; (b) Provision of daily care: organizes its actions and practices in search of satisfying the basic needs of the child such as subsistence, protection and affection; (c) Organization of daily life: are the procedures in domestic life for the resolution of day-to-day tensions, working with routines and family rituals to reduce stress in children; d) Connection with networks and search for social support: identify, access and use sources for emotional, instrumental or economic support to support parenting and; e) Safety guarantees: how to care for the child's safety through policies, knowing their rights and ensuring compliance with them in all areas in which they develop.

Reflective parental competence

It allows organizing the experience of parenting, becoming aware of the influences and their trajectories, in order to feed back and enrich themselves with reflection on the impact that their daily practices have on their daughters and sons, for making decisions about parenting and discipline (Acevedo et al., 2016; Gómez & Contreras, 2019). The five components that support reflective parenting competence are:

(a) Construction of a family project: focuses on exploring, negotiating and organizing positive and realistic expectations around the type of family they wish to build; (b) Anticipation of relevant scenarios: allows visualizing, anticipating, analyzing and preparing action alternatives for different situations, scenarios and issues that may be addressed throughout the life of the children and their upbringing in general; (c) Monitoring influences and metaparenting: identify and follow up on different influences that may impact on the child's development and reflect on their parental role and its influence on their children; d) Historicizing parenting: go through a process of healing past experiences as children and as mothers and fathers, allowing them to develop a growth attitude in which they take up the aspects with which they wish to direct their parenting and; e) Parental self-care: take care of their physical and mental health to have the energy and resources for the exercise of their parenting.

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Developing parental competencies promotes the improvement of effective, healthy and respectful parenting skills and behaviors, which will have a favorable impact on the child's self-esteem (Allauca et al., 2021); favoring positive communication; improving their attitude and relationship with their parents; contributing to the development of their problem-solving skills; and improving their cognitive development and academic performance (Lara & Quintana, 2022).

Method

This is a quantitative, descriptive and non-experimental cross-sectional research, considering that the quantitative method poses a delimited and concrete problem, with previous studies that will guide the research, and whose data are the product of measurements that will be analyzed with statistical methods. The descriptive aspect refers to specifying the characteristics and tendencies of the construct within the study group, the non-experimental aspect refers to not manipulating the study variable, and the cross-sectional aspect is defined in the collection of data at a single moment and time (Hernández-Sampieri et al., 2018).

Participants

The sampling was by convenience, which is characterized by taking a population that is easily accessible or through open calls (Hernández & Carpio,2019). An open call was made to a community and 13 mothers and one father with ages ranging from 25 to 52 years agreed to participate in the study. The participants had sons and daughters in fifth and sixth grade of elementary school from different schools in the Miguel Hidalgo municipality in Mexico City, attached to the Peraj Mexico program and who participated in a parental training program.

Instrument

The Positive Parenting Scale E2P v2 constructed by Gómez and Contreras (2019) was used, which aims to reflexively assess the frequency of positive parenting practices reported by a parent or significant caregiver of children and adolescents between 0 and 17 years 11 months of age.

In this project, the scale corresponding to children from 8 to 12 years of age was retaken, which is composed of 77 items in total. At the beginning there are 21 questions on demographic aspects that characterize the person answering the form. Next, instructions are given for answering the instrument on a five-point Likert-type scale: never, almost never, sometimes, almost always and always. These options will be used to indicate the frequency with which each statement describes a situation in your daily life.

The survey is composed of 56 items that allude to statements that occur in the life of the child's father, mother or caregiver. In turn, these 56 statements are divided into four dimensions: bonding, formative, protective and reflective parental competence.

This instrument has been validated by Gómez and Contreras (2019) through a confirmatory factor analysis. It has a structural validity of 0.82 as maximum, 0.42 as minimum and an average of 0.61; a content validity of 0.99 and 0.88, a reliability of 0.93 according to Cronbach's Alpha throughout the survey. Due to the number of participants in the present study, it is not possible to perform a proper validity analysis.

Procedure

Phase 1. Participant contact

Through an open call launched in coordination with Peraj Mexico A.C. to mothers and fathers of families in the Miguel Hidalgo district of Mexico City, assigned to the Peraj program in this community, 31 participants were enrolled.

Phase 2. Application of the instrument

Including the implementation of the program directed to the families, this program is oriented to the strengthening of parental competencies and lasted one month. At the end of the interventions, the Positive Parenting Scale E2P v2 was applied through a google form and the participants were given the link to answer.

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Phase 3. Analysis of results

Once the results were available, the data were emptied into the statistical package for social sciences IBM SPSS Statistics Version 25, where the values of never were replaced by 0, almost never by 1, sometimes by 2, almost always by 3 and always by 4. This according to the indications of the manual of Gómez and Contreras (2019), so that subsequently the sum of the participants' responses was made, to continue with the descriptive analysis of the data in general and specifically for each competency.

From the above, it was possible to make an interpretation based on the authors, who indicate different zones in which the participants are located according to their score; optimal, monitoring and risk zones.

Results

The data obtained were analyzed using the SPSS statistical package, following the E2P interpretation procedure established by the authors. First, a value was assigned to each of the Likert Scale items: 0 for "Never", 1 for "Almost never", 2 for "Sometimes", 3 for "Almost always" and 4 for "Always". Next, the total points were summed according to the participants' responses for each group of positive parenting practices (items) corresponding to the parenting competencies: items 1-14, bonding competencies; items 15-29, formative competencies; items 30-42, protective competencies; and items 43-56, reflective competencies. From the above, the following table of results was obtained (see Table 1), which shows the frequency with which each participant executes positive parenting practices in their daily lives in the areas evaluated (Gómez and Contreras, 2019)

	Binding comp. P. max. 56	Training comp. P. max. 60	Protective comp. P. max. 52	Reflective comp. P. max. 56
P1	41	52	47	51
P2	45	54	49	54
P3	49	54	49	49
P4	33	37	43	34
P5	33	39	39	32
P6	35	38	42	40
P7	34	38	41	27
P8	41	51	46	50
P9	41	39	43	39
P10	29	39	41	29
P11	39	51	41	35
P12	49	58	49	42
P13	50	57	50	49
P14	29	28	41	31

Note: P: Participant; P. max: Maximum score. E2P parenting scale for children between 8 and 12 years old

Table 1 Results of the application of the E2P Parenting Scale, total score per competency (N=14)
Source: Own elaboration

A descriptive analysis of the above data showed that in the group of mothers and fathers studied (N=14), formative competencies are presented with a higher frequency (M=45.36), with a minimum of 28 points and a maximum of 58; in second place, protective competencies (M=44.36), with a minimum of 39 points and a maximum of 50; in third place, reflective competencies (M=40. 14), with a minimum of 27 points and a maximum of 54 and in fourth place the bonding competencies (M=39.14), with a minimum of 29 points and a maximum of 50. On the other hand, the standard deviation indicates that the protective competencies have a lower variation with a SD=3.81, while the formative competencies present the highest variation with a SD=9.42 (see Table 2).

	N	M	SD	Minimum	Maximum
Bonding competencies	14	39.14	7.24	29	50
Training competencies	14	45.36	9.42	28	58
Protective powers	14	44.36	3.81	39	50
Reflective competencies	14	40.14	9.11	27	54

Table 2 Descriptive statistics of the results of the E2P application
Source: Own elaboration

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Following the authors' interpretation procedure for the E2P scale, the scores obtained by each participant were compared with the interpretation table corresponding to children between 8 and 12 years of age. This table divides the maximum score for each group of competencies into deciles, grouping them into three categories: "High frequency", "Intermediate frequency" and "Low frequency". From this procedure it was found that the parental competencies of the sample (N=14) are concentrated in a low frequency level (see Table 3): 71% for bonding (n=10), 64% for reflective (n=9), 57% for protective (n=8) and 50% for formative. In second place is the high frequency level with: 29% for the formative (n=4), 29% for the protective (n=4), 21% for the bonding (n=3) and 21% for the reflective (n=3). Finally, in third place is the intermediate frequency level with: 21% for the formative (n=3), 14% for the protective (n=2), 14% for the reflective (n=2) and 7% for the bonding (n=1).

Competencies	Low frequency		Intermediate frequency		High frequency	
	f	%	*f*	%	*f*	%
Links	10	71	1	7	3	21
Training	7	50	3	21	4	29
Protectors	8	57	2	14	4	29
Reflective	9	64	2	14	3	21

Table 3 Interpretation of the results E2P parenting scale (N=14)
Source: Own elaboration

The next step in the authors' interpretation process consisted of creating the parental competencies profile, grouping them into three categories: Risk zone for participants whose bonding competencies were found at the "Low frequency" level or who showed two or more different areas at this level; Monitoring zone for participants who presented one area at "Low frequency" (other than bonding competencies) or two or more areas at "Intermediate frequency" and; Optimal zone for participants who did not show areas at "Low frequency" or presented 3 or more areas at "High frequency".

Upon classification as indicated, it was found that 71.43% (n=10) of the mothers and fathers were in the risk zone, 21.43% (n=3) in the optimal zone and 7.14% (n=1) in the monitoring zone (see Table 4).

Zone	N	Percentage %
Optimum	3	21.43
Monitoring	1	7.14
Risk	10	71.43
Total	14	100

Table 4 Profile of parental competencies
Source: Own elaboration

Discussion of results

The objective of the present research was to describe the parental competencies in mothers and fathers developed from strengthening interventions, which are defined according to Gómez and Contreras (2019), as the set of knowledge, attitudes and bonding, formative, protective and reflective parenting practices, which allow to flexibly guide behavior in the face of the diversity of family and parenting situations, with the purpose of meeting the needs of children and safeguarding their welfare and the exercise of their rights.

In this sense, it was found that in the sample studied (N=14) the highest score corresponded to formative competencies (M=45.56, SD=9.42), followed by protective (M=44.36, SD=3.81), reflective (M=40.14, SD=9.11) and bonding (M=39.14, SD=7. 24), which contrasts with the data obtained by Jami (2019), who found that the highest score corresponded to protective competencies (M=55.43, SD= 7.17), followed by bonding (M=45.98, SD=5.91), formative (M=39.13, SD=5.88) and reflective competencies (M=33.41, SD=5.39), a discrepancy that can be explained by cultural differences and the size of the study samples.

Another result showed that the scores obtained place more than 50% of the mothers and fathers in the sample (N=14) in low frequency levels with respect to their parental competencies: 71% (n=10) in bonding competencies, 64% (n=9) in reflective competencies, 57% (n=8) in protective competencies and 50% (n=7) in formative competencies. These results are consistent with the study conducted by Vera (2021), where more than 50% of the mothers and fathers showed difficulty in exercising their parental competencies in the four areas, placing their responses in a low frequency zone: 63% for the bonding, 61% for the reflective, 53% for the formative and 48% for the protective.

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However, the data obtained differ with what was found by Pinta and Pozo (2018), who found that more than 47% show formative (61%), reflective (64%) and protective (47%) competencies in a high frequency zone, in contrast to 42% who show their bonding competencies in a low frequency zone. The above shows the importance of developing educational programs to reinforce and stimulate parenting competencies, and highlights the need to carry out research to help explain the differences found in the development of parenting competencies.

Regarding the parental competencies profile of the study group (N=14), it was found that 71.43% (n=10) of the mothers and fathers are in the risk zone, 21.43% (n=3) in the optimal zone and 7.14% (n=1) in the monitoring zone, data that contrast with what was found by Zurita (2022) and Matteoni (2017), since the former found in a sample of 27 participants, that 48. 1% are in the monitoring zone, 22.2% in the risk zone and 14.8% in the optimal zone; while the second, in a sample of 37 participants, observed that 37.8% exercise positive parenting optimally, in contrast to 62.2% who do so below that zone (37.8%, n=14 in the monitoring zone and 24.4%, n=9 in the risk zone).

Despite their differences, these results indicate that a very low percentage of mothers and fathers are in an optimal zone in the exercise of their parental competencies, so that the highest percentages correspond to the risk and monitoring zones. This shows the diversity of responses that can be obtained when analyzing parenting practices within parental competencies. In spite of this, it can be observed that the researches coincide in that the practices within the bonding and reflective competencies are those that are carried out less frequently.

Conclusions

In the present research, parental competencies in mothers and fathers developed from strengthening interventions were described, found in the parental competencies profile, that most of the study group (71.43%, n=10) is in the risk zone because they exercise their parental competencies at low frequency levels: 71% for bonding, 64% for reflective, 57% for protective and 50% for formative.

This suggests, according to Gómez and Contreras (2019), that mothers and fathers require specialized interventions, preventive accompaniment, counseling, psychoeducation or parental competencies workshops, in addition to a new evaluation in a maximum period of six months.

From the results it is also concluded that the group of competencies that are exercised less frequently are the bonding competencies. This is directly related to the fact that the group is in the risk zone, since these are of great importance in the affective relationship of mothers and fathers with their children; in the development of their parenting responsibilities; and in the support, accompaniment, affection and respect, as triggers for the socio-affective strengthening of children and adolescents (Márquez et al., 2021). Therefore, Gómez and Contreras (2019) consider that, as these competencies are found in low frequency, they should automatically be classified in the risk zone.

In contrast to the above, the competencies that are presented with a higher frequency are the protective ones, which obtained the second highest mean score, but with a lower variance (M=44.36, SD=3.81), so that the highest percentages of responses are distributed between always and almost always. Thus, it is expected that at least 47% of the mothers and fathers in the group studied, have the ability to: organize parenting actions and practices that allow satisfying the child's basic needs; structure an ecological environment that provides elements of predictability, routines and rituals to the child's life; and identify, access and use sources of emotional, instrumental or economic support for the optimal achievement of current parenting goals (Gómez and Contreras, 2019).

Finally, the research found and the parental competencies profile obtained, allow recognizing the importance of developing parental training programs focused on strengthening parental competencies in its four dimensions. From the formative area to develop and strengthen the capacity that favors the exploration and learning processes of children, enhance their autonomy, as well as regulate and lead the child's behavior.

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Also, from the reflective area to strengthen the capacity to visualize, anticipate, analyze and prepare action alternatives in the face of challenging parenting scenarios, as well as to deploy attitudes and practices that favor their appropriate physical and mental health. From the bonding area to strengthen the parental ability to pay attention to signals and interpret them in a contingent manner, accompany, modulate and calm emotional states of stress and psychological suffering of the child. And from the protective area to strengthen the ability to protect the physical, emotional and psychosexual development of the child, as well as to understand the relevance of good treatment of children as a philosophy of respect and dignity (Gómez & Contreras, 2019).

Recommendations

Based on what was obtained in the research, for the purpose of continuing to work with parents, from the actions generated by the university in response to the needs of the community, it is suggested to:

- Develop parental training programs that contribute to the strengthening of parental competencies in their four dimensions: bonding, protective, formative and reflective.
- Generate models of guidelines for the implementation of parental training programs on parental competencies that allow replicating the initiatives in other institutions.
- Conduct research that analyzes the psychometric properties of the Positive Parenting Scale (E2P) applied to the Mexican population, to guarantee its validity and reliability as an instrument in the evaluation of parental competencies.
- To assess parental competencies at pre- and post-intervention moments, to determine the impact of parental training programs.
- Conduct research on the relationship of parenting competencies to student learning.
- Develop university programs that encourage student participation in the implementation of parental training models.

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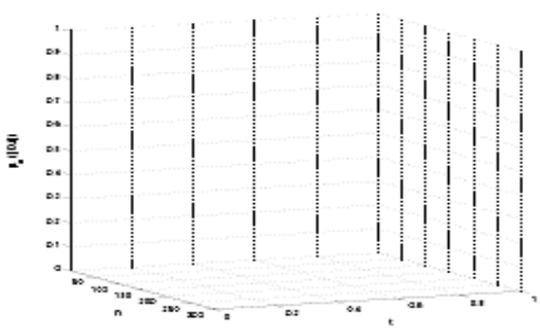

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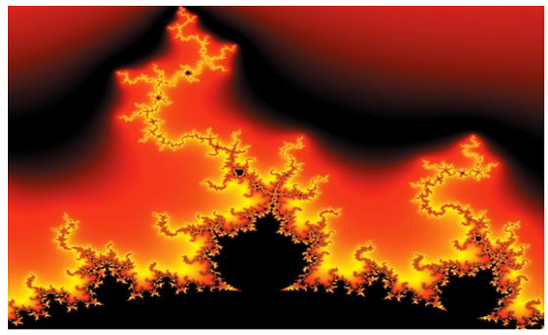

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