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Artículos científicos

Análisis socioeducativo de la empatía por los números aplicado a 228 alumnos de la carrera de psicología del Centro Universitario de la Costa U. de G.

Socio-educational analysis of empathy for numbers applied to 228 students of the psychology career of the Centro Universitario de la Costa U. de G.

Análise socioeducativa de empatia por números aplicada a 228 alunos de psicologia do Centro Universitário da Costa U. de G.

Claudio Rafael Vásquez Martínez
Universidad de Guadalajara, México
crvasquezm@gmail.com
https://orcid.org/0000-0001-6383-270X

Felipe Anastacio González González
Universidad Autónoma de Tamaulipas, México
fgonzale28@hotmail.com
https://orcid.org/0000-0002-1410-8616

Resumen

El objeto del presente trabajo fue analizar la empatía por los números de estudiantes de la carrera de Psicología del Centro Universitario de la Costa, Universidad de Guadalajara. La muestra estuvo constituida por 228 jóvenes escolarizados, de edades comprendidas entre los 21 y los 24 años, de los cuales 115 eran hombres y 113 mujeres. Los resultados demuestran que los alumnos no sienten empatía por los números debido a que no los entienden, son abstractos y se frustran al no saber realizar las operaciones. Esto ocasiona que abandonen la iniciativa de aprender matemáticas. Se concluye, por tanto, que si no se cambia esta percepción de frustración y miedo al realizar operaciones numéricas, los futuros egresados podrían desaprovechar los beneficios que ese conocimiento ofrece en la vida cotidiana.

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Palabras claves: aprendizaje, empatía por los números, socioeducativo.

Abstract

The purpose of this work was to analyze the empathy for the numbers of students of the Psychology career of the University Center of the Coast, University of Guadalajara. The sample consisted of 228 young people in school, aged between 21 and 24 years, of which 115 were men and 113 women. The results show that the students do not feel empathy for the numbers because they do not understand them, they are abstract and they get frustrated by not knowing how to perform the operations. This causes them to give up the initiative to learn math. It is concluded, therefore, that if this perception of frustration and fear is not changed when performing numerical operations, future graduates could miss the benefits that this knowledge offers in daily life.

Keywords: learning, empathy for numbers, socioeducational.

Resumo

O objetivo do presente trabalho foi analisar a empatia pelos números de alunos da carreira de Psicologia do Centro Universitário do Litoral da Universidade de Guadalajara. A amostra foi composta por 228 jovens em idade escolar, com idades entre 21 e 24 anos, sendo 115 homens e 113 mulheres. Os resultados mostram que os alunos não sentem empatia pelos números porque não os compreendem, são abstratos e ficam frustrados quando não sabem realizar as operações. Isso os faz desistir da iniciativa de aprender matemática. Conclui-se, portanto, que se essa percepção de frustração e medo não for alterada ao realizar operações numéricas, os futuros graduados podem perder os benefícios que esse conhecimento oferece no cotidiano.

Palavras-chave: aprendizagem, empatia por números, socioeducativa.

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Introduction

Mathematical reasoning is a practice that any college student should develop. For example, a researcher in the field of psychology - the specialty on which this work is focused - needs statistics to organize the data collected from their study groups (Mendenhall, Beaver & Beaver, 2017). The problem, however, is that sometimes the student assumes a position of rejection before this type of knowledge, which hinders the teaching and learning process. In the words of Alonso-Canovas, Fernández-Estévez and Sánchez-Santad (2008), the brain needs to adopt an active attitude to understand a reasoning, so it can be assumed that if the student is not willing to know the way in which it is can solve a mathematical problem, you will not be able to understand the deductive principles that are required to find the answer you are looking for.

Paenza (2006) explains that the problem with mathematics is not exclusive to a country or a single generation, but is a difficulty experienced throughout the world and at any time, despite the fact that this knowledge is essential for people to encourage their creativity.

For this reason, the purpose of this work was to analyze the empathy for the numbers of students of the psychology career of the University Center of the Coast, University of Guadalajara.

Hypothesis

1. Psychology students at the Center of the Universidad de la Costa (U. de G.) do not show empathy for numbers because they do not know how to carry out mathematical processes to carry out operations successfully.
2. There is no empathy for numbers because they require abstract reasoning that they do not understand.

Theoretical framework

Numbers are entities that are omnipresent in our daily lives, either when a debt is paid, when a bank deposit is received, when the time to move to a place is calculated, etc. All these numerical procedures for organization, analysis and interpretation are based on the principles of a science called statistics (Lipschutz and Schiller, 2000). However, experience shows that many students do not feel empathy for learning to solve problems of this kind.

According to Alonso-Canovas et al. (2008), a percentage of this responsibility falls on the students themselves when they are unwilling to make an effort to understand the essential principles of mathematical reasoning. In other words, the student must be able to activate their solving strategies to solve a problem.

However, for Paenza (2006) the worst enemy of mathematics is the teacher, since it fails to awaken in young people the minimum curiosity to be able to enjoy it. "Mathematics, as it is taught, does not seduce anyone. It is as if they force us to want what we do not want. And that is why the rebellion of young people who resist and reject it "(Paenza, 2008, p. 168). For this reason, Alonso-Canovas et al. (2008, p. 7) offer some suggestions when teaching mathematics:

1. ***Mathematics must be motivating:*** Students do not find a relationship between what they learn in the classroom and their environment because the concepts explained are often used in hypothetical situations; that is, they are not used to solve a daily problem, such as those that arise in soccer matches, video games or any activity more familiar to them.
2. ***Learning must be demonstrative,*** based on reasoning and deduction: Students memorize formulas and examples, but later the problem is changed, so that they will not know how to solve it because they have not yet developed their mathematical agility.
3. ***The problem must be posed:*** In class you should not only look for the answer, but also the question and the necessary data to solve it; Only then will real problems be created that will contribute to the development of student creativity.
4. ***The teacher must bear in mind that mathematics is cumulative:*** A new explanation can only be understood if the previous concepts that support it have been well assimilated. Otherwise, the experience with numbers will be unpleasant, so the student will end up rejecting mathematics (Rius, 21 de mayo de 2015).

In addition to the above, it is worth noting that teachers must demonstrate the utility that underlies mathematical reasoning, because as Musk (2016) explains, "our brain has evolved to discard the information that it thinks is irrelevant" (p. 5). For this author, learning should be focused on solving a specific problem through the use of a tool that must be mastered. In this regard, it should be taken into account that people, sometimes unconsciously, often ask themselves these types of questions when faced with new

knowledge: “Why am I learning this? o Why am I being asked to solve these strange problems?

For this reason, Paenza (2016) offers some ideas about activities that demotivate students.

- The exponent or teacher provides the students with answers to questions that they do not have, so the topic does not interest them.
- In the classroom, problems are worked on that have no practical application in current life, for which the students do not find use in what they are taught.
- Introduce the subject of mathematics in the least attractive way, that is, it is presented to students as something tedious and laborious, rather than something practical and creative through solving games or puzzles.
- The memory of humiliation is one of the main reasons that people have a trauma with mathematics, memories that bring a sense of frustration that link to mathematics.
- The doubt of the reward or the benefit of knowing how to apply numbers, that is, students do not tolerate frustration towards mathematics because they do not see the benefit of that knowledge. In other words, one must think about the process followed to learn to drive, where the learner makes an effort because he is aware that in the end he will be able to drive and ride in a car.
- Believing that in mathematics everything is written and discovered; In other words, mathematics has to be assumed as health sciences, where there are still operations and approaches to be solved.
- Knowledge must be socialized, which implies stopping punishing the person who does not know. In other words, just being a parent or teacher doesn't mean you have all the answers. In fact, the answers to the problems must be sought jointly (Paenza, 2016).

Another factor that hinders the learning of numbers is speed, which has negative effects on learning. In other words, memory fails when people are stressed or pressured over time to learn. In addition to this, you should try to work more to develop skills than to get good grades. Therefore, Boaler (2015) concludes that what mathematics needs is to return an open and creative vision to students, as well as to encourage their creativity and reasoning (KienyKe, 2019). Otherwise, people will continue to graduate from schools with deep rejection and ignorance of this basic knowledge (Soto, February 15, 2019).

An example of this is the test carried out by the Ministry of Public Education, which shows that 64.5% of high school students are capable of doing simple operations (such as subtraction, addition or multiplication), while only 21.7% can do these operations with decimals. It has also been documented that only 8.6% of high school students can perform operations such as fractions, powers, and algebraic expressions. Therefore, for Soto (February 15, 2019) it is important to promote financial knowledge, since it promotes in people the acquisition of skills to improve their lives and access better opportunities.

In this context, you cannot help but think longingly about the past and ask what were the factors that drove this situation. It must be considered that many years ago the Mexican culture made great works of engineering, contributions to physics and mathematics, such as the Mayan and Aztec calendar, the consideration of zero as a number or the construction of pyramids (Torres, s. F.).

It is therefore urgent to work to change the current scenario. To do this, we must take our ancestors as an example and turn numbers into entities with which we can learn, even in a playful way.

Methodological framework

Participants

Of the 562 students of the 2019 A school year of the degree in Psychology of the University Center of the Costa de la U. de G., a sample of 228 students was chosen, for which the probabilistic sampling system was applied, specifically simple random sampling, in which - according to Salkind (1999) - each element of the population has an equal and independent probability of being selected.

Sample

For the development of the present scientific research, the sample consisted of 228 young people in school, aged between 21 and 24 years, of which 115 were men and 113 women. In addition to the sex and age of each research subject, Hernández, Fernández and Baptista (2014) mention that the characteristics of the population can be classified according to three aspects: 1) of content: these characteristics refer to the fact that the subjects or objects to investigate have the information required for it; 2) of place: it refers to clearly specifying

the geographical limits and the type of institution where the research will be carried out, and 3) of time: this characteristic refers to the period in which the subjects meet the other characteristics.

In this particular case, the population corresponded to the enrollment of students from the 2019 A school year (January to May) of the Bachelor's degree in Psychology at the University Center of the Costa de la U. de G. The sample is " part or representative fraction of a set of a population, universe or group, which has been obtained in order to investigate certain characteristics of the same "(Ander-Egg, 1995, p. 179).

To obtain the sample of effective subjects, small pieces of folded paper with numbers from 1 to 562 (student enrollment) were placed, which were then placed in a tombola where the statistical treatment was carried out. Afterwards, the data was analyzed in the teachers' room of the University Center of the Costa de la U. de G. at 9:00 in the morning on May 2, 2019.

The probability was the same, since there was no predisposition to choose one element or another; and it was independent because the selection of one element did not influence the choice of another. To determine the sample size, the following formula was applied:

$$n = \frac{Z^2\ Pq\ N}{Ne^2 + Z^2\ Pq}$$

n = Sample size.

Z = Desired confidence level.

P = Proportion of the population with the desired characteristic (success).

q = Proportion of the population without the desired characteristic (failure).

e = Level of error willing to commit.

N = Size of the population.

As:

Z = Desired confidence level 95%

P = Desired success 50%

q = Desired failure 50%

e = Error level 5%

N = Population size of 562 (enrollment).

Developing: n = X, Z = 1.96

P = 0.5 q = 0.5

E = 0.05 N = 562

$$n = \frac{(1.96)^2}{562 *} \frac{* 0.5 * 0.5 * 562}{(0.05)^2 + (1.96)^2 * 0.5 * 0.5}$$

$$\boldsymbol{n = \frac{539.74}{2.3654}}$$

$$\boldsymbol{n = 228}$$

The determined sample size was 228.

Analysis

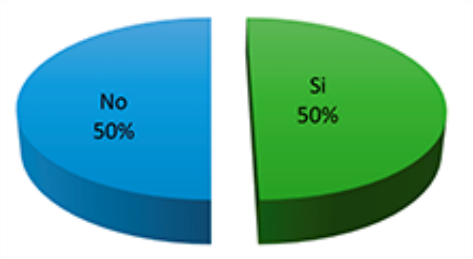
In figure 1 it can be seen that the use of numbers in the student's daily life is very frequent; This means that it is important to promote a taste for numbers.

Figura 1. Uso de los números

Fuente: Elaboración propia

In figure 2 it can be seen that half of the students have a taste for mathematics, an aspect that must be taken into account in the intention to implement a taste for numbers.

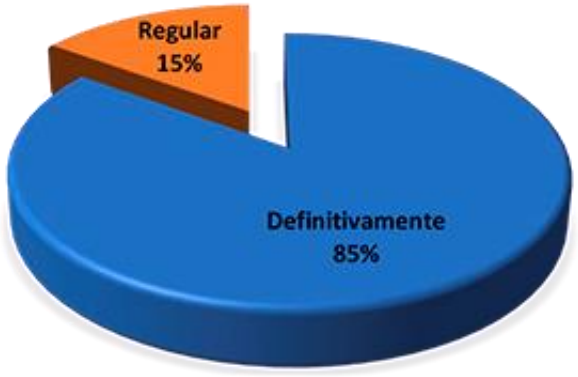
Figura 2. Empatía por las matematicas



Fuente: Elaboración propia

Figure 3 shows that students are convinced that statistics are vital for daily functioning, hence it is important to learn them.

Figura 3. Utilidad de aprender estadística



Fuente: Elaboración propia

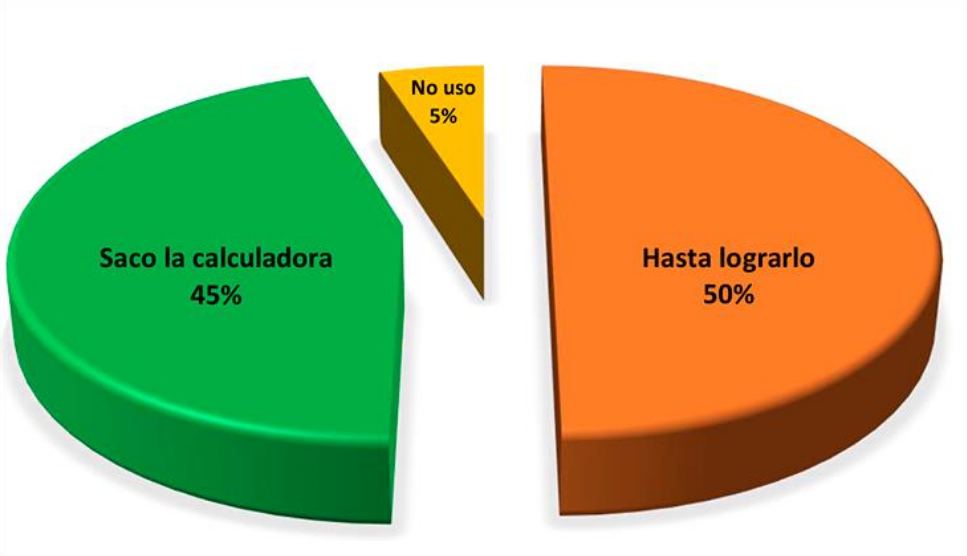
In figure 4 it is observed that students present both optimistic and pessimistic feelings, they are aware of the importance of learning to perform operations and they even like mathematical operations, most of them feel nervous and insecure when performing them.

Figura 4. Sentimiento al realizar operaciones

Fuente: Elaboración propia

Figure 5 shows that half of the students are willing to repeat the exercises to get the correct answer, that is, that determination can be used to achieve significant changes in the learning of numbers.

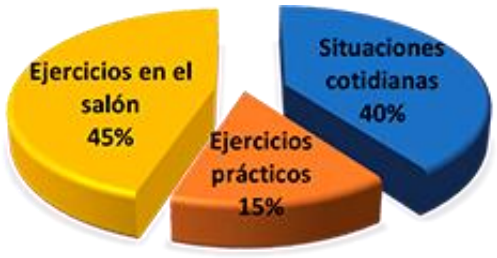
Figura 5. Reacción al no poder realizar una operación



Fuente: Elaboración propia

In figure 6 the students offer suggestions on how they would like to learn to perform operations in the classroom. Of the total, 40% are interested in performing real operations that they can understand because they live them in everyday situations, while 45% mention that they would like to learn how to perform operations with exercises done in the classroom and only 5% did not try.

Figura 6. Sugerencias para el aprendizaje de los números



Fuente: Elaboración propia

Discussion

When interpreting and evaluating the results obtained, it was found that students tend to limit their motivation towards understanding and using numbers due to the lack of a timely methodology according to the context of the university level. Likewise, the results indicate that the students in the sample prefer practical activities in order to assimilate the abstract of numbers.

Although it is known that mathematical processes are important for daily living, it is necessary to strengthen this idea, since young applicants to a university level might believe that by studying a certain career they will be able to get rid of the effort involved in the development of mathematical reasoning.

Conclusion

By analyzing the above, the hypothesis raised can be confirmed, that is, the students of the Psychology career of the University Center of the Costa U. de G. do not feel empathy for the numbers due to feelings of nervousness since they do not understand them, they are abstract and frustrated by not knowing how to perform operations. This causes them to give up the initiative to learn math.

It is also concluded that if this perception of frustration and fear when carrying out operations with numbers is not changed, future graduates could miss the benefits that this knowledge offers in daily life, for example when managing their finances.

As a general conclusion, it is necessary to insist on the importance of changing the strategies used in learning mathematics, because in this way the students will be able to feel more motivation towards this type of content.

Recommendations

After analyzing the information collected, some recommendations can be offered:

1. The learning of numbers or operations should be done based on a topic that is of interest to students.
2. The exercises must be applicable to everyday life, so they must be practical and specific.
3. Students should not only give the answers, but should also pose the problem.
4. The teacher or teacher should make one concept clear before moving on to the next.
5. Mathematical learning must be multisensory, that is, it must include sight, touch and hearing.

Future lines of research

Future lines of research emerge from this study:

- Studies in classrooms in primary, secondary, preparatory and university on empathy for numbers.
- Local studies in educational study centers on the effects of pandemics and post pandemics with their cases of resilience in the application of empathy for numbers.

References

Alonso-Canovas, D., Fernández-Estévez, M. A. y Sánchez-Santad, F. (2008). *El cerebro musical.* Almería: Universidad de Almería.

Ander-Egg, E. (1995). *Técnicas de investigación social*. Buenos Aires: Lumen.

DeConceptos. (2009). *Concepto de número.* Recuperado de https://deconceptos.com/matematica/numero

Hernández, R., Fernández, C. y Baptista, P. (2014). *Metodología de la investigación.* México D. F.: Editorial McGraw-Hill.

KienyKe (2017). *¿No le gustan las matemáticas? Esta sería la razón*. Recuperado de https://www.kienyke.com/historias/no-le-gustan-las-matematicas-esta-seria-la-razon

Lipschutz, S. y Schiller, J. (2000*). Introducción a la probabilidad y estadística*. España: Mc Graw Hill.

Management (20 de julio de 2017). *¿Por qué no te gustan las matemáticas? El fundador de Tesla tiene la respuesta.* Recuperado de https://www.dineroenimagen.com/2017-07-20/88981

Mendenhall, W., Beaver, R. y Beaver, B. (2017). *Probabilidad y estadística para las ciencias sociales del comportamiento y la salud*. México: CENGAGE learning.

Muks, E. (2016). *El empresario que anticipa el futuro.* Ciudad de México: Ediciones Península.

Paenza, A. (2006). *Matemáticas, ¿estás ahí? Sobre números, personajes, problemas y curiosidades*. Buenos Aires: Siglo veintiuno.

Paenza, A. (2008). *Matemática… ¿estás ahí? Episodio 100.* Buenos Aires: Siglo XXI.

Paenza, A. (2016). 7 motivos por los que a muchos no le gustan las matemáticas. *Diario Veloz*. Recuperado de http://www.diarioveloz.com/notas/169728-7-motivos-los-que-muchos-no-le-gustan-las-matematicas

Rius, M. (21 de mayo de 2015). *¿Por qué muchos estudiantes odian las matemáticas?* Recuperado de https://www.lavanguardia.com/vida/20150521/54431772174/estudiantes-odian-matematicas.html/

Salkind, N. (1999). *Método de investigación*. México, D.F.: Prentice-Hall.

Soto, S. (15 de febrero de 2019). *No saber matemáticas condena a los mexicanos a la pobreza*. Recuperado de https://www.dineroenimagen.com/no-saber-matematicas-mexicanos-pobreza

Torres, S. (s. f.) *Breve historia de las matemáticas en México.* Departamento de Matemáticas Facultad de Ciencias UNAM. Recuperado de https://paginas.matem.unam.mx/matematicos/historia-del-instituto/facultad-de-ciencias-de-la-unam/departamento-de-matematicas-facultad-de-ciencias-unam/486-breve-historia-de-las-matematicas-en-mexico

Rol de Contribución	Autor (es)
Conceptualización	Dr. Claudio Rafael Vásquez Martínez (principal); Dr. Felipe Anastacio González González (que apoya)
Metodología	Dr. Claudio Rafael Vásquez Martínez (principal); Dr. Felipe Anastacio González González (que apoya).
Software	Dr. Claudio Rafael Vásquez Martínez (principal); Dr. Felipe Anastacio González González (que apoya).
Validación	Dr. Claudio Rafael Vásquez Martínez (principal); Dr. Felipe Anastacio González González (que apoya).
Análisis Formal	Dr. Claudio Rafael Vásquez Martínez (principal); Dr. Felipe Anastacio González González (que apoya).
Investigación	Dr. Claudio Rafael Vásquez Martínez (principal); Dr. Felipe Anastacio González González (que apoya).
Recursos	Dr. Claudio Rafael Vásquez Martínez (principal); Dr. Felipe Anastacio González González (que apoya).
Curación de datos	Dr. Claudio Rafael Vásquez Martínez (principal); Dr. Felipe Anastacio González González (que apoya).
Escritura - Preparación del borrador original	Dr. Claudio Rafael Vásquez Martínez (principal); Dr. Felipe Anastacio González González (que apoya).
Escritura - Revisión y edición	Dr. Claudio Rafael Vásquez Martínez (principal); Dr. Felipe Anastacio González González (que apoya).
Visualización	Dr. Claudio Rafael Vásquez Martínez (principal); Dr. Felipe Anastacio González González (que apoya).
Supervisión	Dr. Claudio Rafael Vásquez Martínez (principal); Dr. Felipe Anastacio González González (que apoya).
Administración de Proyectos	Dr. Claudio Rafael Vásquez Martínez (principal); Dr. Felipe Anastacio González González (que apoya).
Adquisición de fondos	Dr. Claudio Rafael Vásquez Martínez (principal); Dr. Felipe Anastacio González González (que apoya).