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ORIGINAL ARTICLE

Microlearning and its contribution to the ability to concentrate in high school students

El microaprendizaje y su aporte en la habilidad de concentración en estudiantes de bachillerato

Microlearning e sua contribuição para a capacidade de concentração em alunos do ensino médio

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ORIGINAL ARTICLE

KEYWORDS

Learning, attention, strategies, mathematics, micro contents.

ABSTRACT. This study addressed microlearning strategies in the area of mathematics and their impact on concentration. The objective was to analyze microlearning and its contribution to concentration skills in students of the Paquisha Fiscal Educational Unit at the high school level. The research had a mixed qualitative-quantitative, descriptive and correlational approach, analyzing the variables and their relationship. The population and the sample consisted of thirty-three high school teachers and two experts on the subject; the methods used were analytical and deductive to respond to the objectives of the work. The instrument used was the questionnaire. The results obtained indicate that 67% of the teachers know and identify this type of strategies, among which the most used are short explanatory videos (67%) and readings of small books (18%). It was concluded that these strategies favor concentration, creating significant learning, being an effective and flexible option that allows students to have autonomy and decide when and how to access content, thus improving the virtual education experience and capturing students' attention.

PALABRAS CLAVE

RESUMEN. En este estudio se abordaron las estrategias de microaprendizaje en el área de matemáticas y su repercusión en la concentración. El objetivo fue analizar el microaprendizaje y su aporte en la habilidad de concentración en estudiantes de la Unidad Educativa Fiscal Paquisha del nivel de bachillerato. La investigación fue de enfoque mixto cualitativo-cuantitativo, de tipo

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Aprendizaje, atención, estrategias, matemáticas, microcontenidos.

descriptivo y correlacional analizando las variables y su relación. La población y la muestra estuvo conformada por treinta y tres docentes del nivel de bachillerato y dos expertos en el tema, los métodos empleados fueron el analítico y deductivo para responder a los objetivos del trabajo. El instrumento utilizado fue el cuestionario. Los resultados obtenidos indican que el 67% de los docentes conocen e identifican este tipo de estrategias, entre las cuales las más usadas son videos explicativos breves con un 67% y lecturas de libros pequeños en un 18%. Se concluyó que éstas favorecen a la concentración creando aprendizajes significativos, siendo ésta una opción efectiva y flexible, que permite a los estudiantes tener autonomía y decidir cuándo y cómo acceder a contenidos, mejorando así la experiencia de la educación virtual y captando la atención de los alumnos.

PALAVRAS-CHAVE

Aprendizagem, atenção, estratégias, matemática, micro-conteúdo.

RESUMO. Neste estudo, foram abordadas as estratégias de microaprendizagem na área da matemática e o seu impacto na concentração. O objetivo foi analisar o microlearning e o seu contributo para a capacidade de concentração nos alunos da Unidade de Educação Fiscal Paquisha a nível de bacharelado. A pesquisa teve uma abordagem qualitativa-quantitativa mista, descritiva e correlacional, analisando as variáveis e sua relação. A população e a amostra foram constituídas por trinta e três professores do ensino médio e dois especialistas na temática, os métodos utilizados foram analíticos e dedutivos para responder aos objetivos do trabalho. O instrumento utilizado foi o questionário. Os resultados obtidos indicam que 67% dos professores conhecem e identificam este tipo de estratégias, entre as quais as mais utilizadas são vídeos curtos explicativos com 67% e leituras de livrinhos em 18%. Concluiu-se que estes favorecem a concentração ao criar uma aprendizagem significativa, sendo esta uma opção eficaz e flexível, que permite aos alunos ter autonomia e decidir quando e como aceder aos conteúdos, melhorando assim a vivência da educação virtual e captando a atenção dos alunos.

1. INTRODUCTION

In Ecuador, the academic curriculum deals in a special way with subjects such as mathematics, to achieve the development of individuals, the treatment depends on the social and family context of the students, the teacher's training, and the strategies used in the teaching-learning process (Bedor, 2018). They must use tools that contribute to meaningful learning, including microlearning, to offer accurate knowledge to students (Oviedo, 2018). This is a concern of teachers, choosing the appropriate strategy to capture the attention of students by improving their concentration and academic results in general (Borja, 2017).

It is very common to observe in classrooms, students who have concentration and attention difficulties (Raviolo & Farré, 2021). The research context has not been the exception, as corroborated with teachers and students there are many problems of distractions in explanations, unfinished tasks, presence of behaviors at home that have an inappropriate impact on student training, this is a product of the scarcity of strategies, in this case, of study in particular of microlearning in the area of mathematics. This negatively affects the concentration skills and motivation of the students, making classes tedious and tiring. Therefore, it is proposed as a research problem that the lack of microlearning strategies in the area of mathematics affects the concentration skills of high school students.

Given these statements and recognized the importance of microlearning strategies and concentration, this research has the general objective of analyzing microlearning and its contribution to the ability to concentrate in high school students.

The theoretical foundations relevant to investigative work are presented, such as microlearning variables, their strategies, concentration, and levels of this; to facilitate understanding of the topic.

Microlearning is a way of teaching and delivering content to students in small, specific streams (Leandro & Valente, 2020). It is an active and agile learning method that uses web content, with short activities and arranges to learn in reduced steps. It enables the learning process in tiny content units, through technologies and social interaction, being a feasible alternative to meet current teaching demands (Oviedo, 2018).

Microlearning strategies are used to attract students and facilitate the controlled learning process (Álvarez, 2019). Se componen de pequeños fragmentos de información (Criollo, 2021). They facilitate teaching and consolidation They are made up of small pieces of information idation of the contents (Barradas, 2020). These activities are appropriate to the style and rhythm of each student, among the characteristics is that they are brief, continuous, gradual, informal, and contextual (Trabaldo et al., 2017).

The concentration constitutes another variable of the investigation, according to Bernal (2016) n the educational field, it represents a problem due to the lack of attention of the students in the classes, which hinders the process of teaching and meaningful learning, being a challenge for teachers today. According to Alarcón and Guzmán (2016) refers to the inhibition of irrelevant information and the targeting of relevant information. For Loyola (2017) This is a characteristic of attention and is related to the ability to focus on certain things. In the opinion of Pérez and López (2016), it is necessary for learning because it represents the individual's attention to learn, therefore it must be previously motivated.

According to Azanza (2018) there are two levels of concentration: involuntary when witnessing objects or situations that act on the senses for the first time and voluntary when it is a conscious activity of the person towards a goal. Therefore, concentration is the ability of individuals to focus on a specific stimulus or activity, the levels can be from the highest to the lowest, this will be conditioned by factors such as age, motivation, interests, needs, and context (Servera & Galván, 2016).

Contributions of Alarcón (2016), Álvarez (2017), Salinas and Marín (2014) agree on the benefits of microlearning strategies applied to boys, girls, and adolescents, who study in educational units around the world, which improve results, for which teacher training is recommended, and the change of attitudes of students. students, encourage active work, autonomy, and flexibility; In the aforementioned experiences, positive changes in attention and concentration have been obtained, managing to maintain it for a longer time in the development of the classes.

2. METHOD AND MATERIALS

The research had a mixed approach (qualitative and quantitative). Quantitative aspects were addressed through the surveys that were tabulated, generating clear and quantifiable results on the study variables. The qualitative point was carried out through the interviews that served to have updated and extensive information. Descriptive and exploratory research was implemented, it is not an experiment, rather an explanation based on reality is detailed in an orderly way, taking into consideration the group of people, institutions, or communities analyzing the two variables and their relationship, coinciding with Hernández et al. (2014) who indicate that descriptive studies are the basis of research providing information to carry out explanatory studies that generate a sense of understanding and are highly structured.

The research population was made up of 33 teachers from the Paquisha Fiscal Educational Unit of the city of Manta, province of Manabí, Ecuador country at the high school level, and two experts on the subject. The

sampling, in this case, was intentional or non-probabilistic, since it is a limited number of teachers, it will be applied to the total population to obtain reliable results. The research responds to the analytical and inductive method, the first one served to study the related dimensions in detail and then synthesize all the information obtained, the second for its part, facilitated the construction of general conclusions from the particular explanations.

The research technique used was the questionnaire, using the tools of the interview and the survey. The structured interview with experts with 5 questions on the subject in question was used as an instrument, in addition to surveys using a 9-item questionnaire addressed to teachers, with closed questions that were validated by experts on the subject using the Cronbach's alpha method, checking a degree of reliability of 95% of the instruments, the same ones that were applied by interactive means such as Google forms and WhatsApp, facilitating the collection of information on the variables under investigation. For the processing and analysis of the results, the statistical method was used that served to determine the conclusions of the study.

3. RESULTS

The exploratory inquiry to high school teachers had main findings in the following aspects:

Table 1.

Frequency of application of microlearning strategies in current education

No.	ALTERNATIVES	Teachers	%
1	Very often	5	15%
2	Frequently	15	46%
3	Occasionally	10	30%
4	Rarely	3	9%
5	Never	0	0%
	TOTAL	**33**	**100%**

Note. Presents the results of the survey applied to teachers. Own elaboration.

The data in Table 1 indicate that 46% of the teachers have frequently applied micro-learning strategies in the students under their charge, 30% occasionally, 15% very frequently and 9% rarely. About this, the results show that the teachers of the educational unit understudy if they frequently use these strategies, mainly in virtual learning since they have had to adapt large contents to this format due to a question of capacity, time, and resources to facilitate learning, capture attention and improve your students' concentration.

About this approach, the experts consulted highlighted that microlearning responds to the current needs of online education, being one of the strategies most used by teachers globally due to its contribution to the ability to concentrate, converting information into easy, fun, and informal learning, simplifying knowledge, so that it can be acquired at any time or place, being more flexible for students in terms of access and time, contributing to their concentration. For this, they recommend simple language, empathy, personalization of activities, specific content, playful strategies, among other strategies.

Table 2.
Micro-learning strategies for the area of mathematics

No.	ALTERNATIVES	Teachers	%
1	Students must read an entire small book	6	18%
2	They send divided assignments to their students	4	12%
3	They receive complete tasks well done.	1	3%
4	They give a short explanatory video to their students	22	67%
	TOTAL	33	100%

Note. Presents the results of the survey applied to teachers. Own elaboration.

About the results of this item table 2, 67% indicated as micro-learning strategies for the mathematics area of the high school level the delivery of a short explanatory video to their students, 18% indicated the reading of a small book in full, 12% sent divided assignments to their students and 3% received completed assignments well done. This shows that most teachers identify micro-learning strategies, however, it is necessary to diversify these since there is a great variety that can be used in different areas to facilitate virtual learning, always seeking to reach students through small contents.

Table 3.
Importance of microlearning strategies in current education

No.	ALTERNATIVES	Teachers	%
1	Very important	24	73%
2	Important	8	24%
3	Semi important	1	3%
4	Less important	0	0%
5	Nothing important	0	0%
	TOTAL	33	100%

Note. Presents the results of the survey applied to teachers. Own elaboration.

According to the results of item table 3, 73% considered it very important to apply micro-learning strategies in virtual education, 24% considered it important, and 3% semi-important. About this, it is evident that teachers know the importance of these strategies to acquire, elaborate, store, transmit and maintain knowledge, especially in virtual education, which means being more efficient in terms of the information that is transmitted and the time in which it is performed.

Table 4.
Concentration in high school students can be enhanced with appropriate methodological strategies.

No.	ALTERNATIVES	Teachers	%
1	Always	25	76%
2	Usually	6	18%
3	Sometimes	2	6%
4	Never	0	0%
	TOTAL	33	100%

Note. Presents the results of the survey applied to teachers. Own elaboration.

In the results of table 4, 76% indicated that the concentration in high school students can always be enhanced with appropriate methodological strategies, 18% that almost always, and 6% that sometimes. In summary, concentration can be improved through effective strategies according to the area and activities that facilitate learning, by improving the capture of attention, students can spend longer periods attending the same activity.

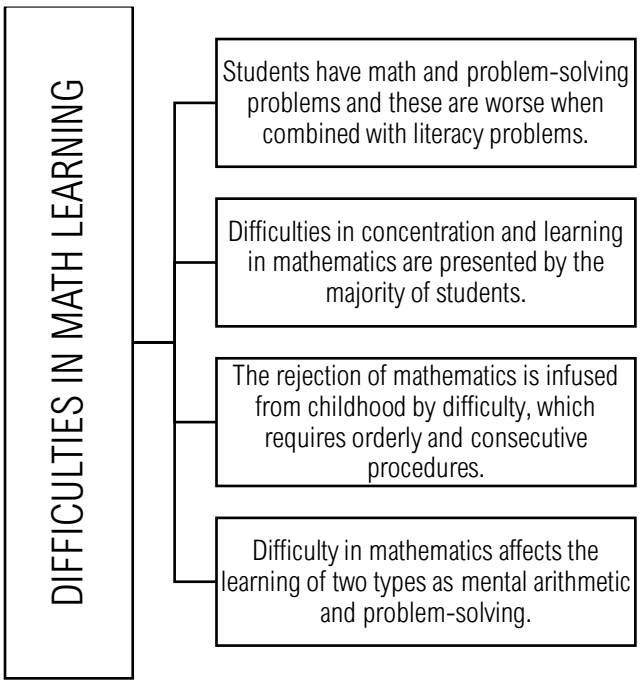

Figure 1. *Mathematics learning problems and difficulties*

Note. Presents the results of the interview applied to teachers. Own elaboration.

The experts interviewed according to figure 1 pointed out that the students present problems in the area regarding calculation and problem solving, for which it is essential to capture the attention and improve the concentration levels of the students, since they have little Interest and difficulty in concentrating on the subject of mathematics due to the way teachers carry out teaching, the methods, creativity, empathy is not adequate to mitigate the fear that has been instilled in this subject since childhood.

On the other hand, the interviewee points out that from childhood rejection of mathematics is infused, being a didactic and cultural practice, which hinders the teaching process, influencing the student, both in their emotional and cognitive aspects. Therefore, it is necessary to improve the approach to this subject, making it more interesting and developing motivational strategies.

Table 5.
Strategies to detect concentration in high school students

No.	ALTERNATIVES	Teachers	%
1	Dialogue	12	36%
2	Evaluation	5	15%
3	Observation	13	40%
4	Empathy	3	9%
	TOTAL	33	100%

Note. Presents the results of the survey applied to teachers. Own elaboration.

Concerning table 5, regarding the strategies they consider appropriate to detect concentration in high school students, 40% indicated observation, 36% dialogue, 15% evaluation, and 9% empathy. About this, the most relevant thing is to program an evaluation with the students which entails the application of observation and dialogue strategies in a planned and structured way to have reliable results.

About the previous statements, the difficulty in attention, concentration, and participation is given by fear, because there are barriers before learning them, being one of the areas with the greatest problems worldwide, for which teachers must better direct their strategies through games, didactics, applications that facilitate concentration and the learning process in students; It is noted that when the class is long, it requires sufficient initiative from the teacher to keep the students attentive, in the current context spending a lot of time in front of the computer is physically and emotionally tiring, which is why it constitutes a solution or alternative to facilitate the learning process.

4. DISCUSSION

The teachers of the educational unit under study use these strategies mostly in virtual learning because they had to adapt large content to this format due to capacity, time, and resources to facilitate learning, capture attention and improve concentration. of his students.

It was found that most teachers know and identify microlearning strategies, 46% highlighted that they frequently apply them coinciding with Linder (2006), From Juan et al. (2012) who point out that teachers need to recognize and apply these short-term, interconnected forms of learning associated with activities to learn by micro-content. The results show that teachers have been forced to use these strategies in virtual learning since they had to adapt large content to this format due to capacity, time and resources to facilitate learning, capture attention and improve the concentration of their students. students. However, there is a percentage of teachers who, even being clear about this concept, apply it infrequently, which requires training and updating to take advantage of the benefits of this methodology.

It was also identified that among the strategies that are applied mostly in the area of mathematics in high school are 67% short explanatory videos and 18% readings of short books, this is in line with what Buchem and Hamelmann (2010) argue among the microlearning strategies, educational micro-videos, tutorials, reading of paragraphs, answering questionnaires or tests, playful learning environments, information summarized in

graphics, maps or diagrams stand out. To a large extent, they identify microlearning strategies, but they present difficulties when applying them, for which it is necessary to diversify these since there is a great variety that can be used in various areas to facilitate virtual learning, always seeking through small content to reach the students.

Regarding the practice of this methodology, if they use these strategies mainly in virtual learning because they had to adapt large content to this format due to capacity, time, and resources to facilitate learning, capture attention and improve the concentration of his students. Regarding this Linder (2006) points out that the microlearning approach poses challenges for teachers, having to use this tool due to its multiple utilities, having to personalize the content and knowledge.

In the interview, it was highlighted that current changes have promoted the identification and application of microlearning strategies, which are related to social interaction and new technologies, this coincides with what Santos and Bastos emphasize (2020) due in large part to the fact that students do not show the same interest in traditional methods, it has been necessary to find new ways of teaching and learning that can retain and attract the attention and concentration of students in different ways.

Appropriate methodological strategies facilitate the concentration of students according to the results, among the strategies they consider appropriate to know the level of concentration, of these 40% indicated observation, 36% dialogue, 15% evaluation, and 9 % empathy. Coinciding with Azanza (2018) which indicates that by applying these strategies it is possible to improve the fixation, visual tracking and concentration of students, also Guzmán et al. (2019) they limit that to detect this it is necessary to carry out evaluations and diagnoses of each of the students, for which they will require observation and dialogue processes not only with the students but also with teachers and parents to detect symptoms of impulsivity, disorganization, activity problems, low tolerance or other.

It was evidenced that teachers are in a constant search for methodologies to capture the attention and concentration of their students even more in a subject such as mathematics in which there are inconveniences and difficulties; To evaluate and measure it, they require observation and dialogue processes not only with students but also with teachers and parents to detect symptoms of impulsivity, disorganization, activity problems, low tolerance or others, this requires more work, coordination, and commitment between the parties, as well as teacher training to have better results in their pedagogical area.

The results of the interviews indicated that microlearning applied in mathematics favors students' concentration and improves knowledge retention, being easier, more fun, and informal; simplifying knowledge, in such a way that it can be acquired at any time or place, giving flexibility. This backed by Santos and Wands (2020) which indicate that this methodology favors concentration in any type of subject, despite being recent and little known by teachers, it presents great potential for planning and development, contributing to better teaching practice and enabling a more effective learning process online.

76% indicated that the concentration in high school students can be enhanced with appropriate methodological strategies. According to Azanza (2018) by applying suitable methodological strategies, it is possible to improve the fixation, visual monitoring, and concentration of the students, through the appropriate methods, sustained attention can be achieved, which facilitates continuous learning and development.

Regarding microlearning strategies and their impact on student concentration, the survey found that 73% consider their application to be very important in virtual education, being a successful experience in this context. Coinciding with Criollo (2021), this methodology has been the response to many teachers around the world to capture the attention of their students and ensure that they live better virtual educational experiences, according to the flexibility that their own work times require. This is a strategy that can serve to improve the online education experience, since it allows reaching students from remote places, with little connectivity, as it is ideal for learning through cell phones.

According to the successful experiences of the teachers surveyed and professionals interviewed, they agree that the application of microlearning strategies improves the concentration capacity of high school students, for this they recommend actions such as dialogue, as it is relevant to awaken in students the interest in knowing and learning new things, clear and concrete content, simple language, showing empathy, opening up space for doubts and participation, sequencing the content, applying mathematics in problems related to daily life so that they know the usefulness of mathematics for everyday life, apply playful strategies through recreational games, images, creativity that manages to maintain the students' concentration.

This coincides with Bernal (2016) and Tirado (2016) who point out that we must bet on educational innovation, break old schemes, permanent evaluation through diagnosis, training, and qualitative measurements, take into account the needs and interests of students, creative playful strategies, use of technological resources, and innovative platforms that facilitate the job. Tirado (2016) indicates that attention and concentration are developed through visual components, verbal aptitude, logic, attention, and personal life exercises. Taking into account that, through attention, the mind can focus on a stimulus among all those around and ignore the others, it is necessary to train and guide students in these skills.

This research was important or remarkable within the educational field because knowing the problem, solutions, strategies, and guidelines were proposed to improve the concentration of high school students through an appropriate educational methodology, eradicating traditionalist strategies that do not achieve the desired results. for which it is also suggested to carry out new studies at different levels that clarify the study problems.

The current context and educational experiences have shown that microlearning strategies are a solution that facilitates concentration and therefore learning in virtual environments, however, for the teachers of the studied institution it is still difficult to understand and apply them completely, due to the rapid adaptation process that has been lived, which requires love, patience, understanding, innovation, and training in digital tools to improve the online education experience.

5. CONCLUSIONS

Microlearning strategies in mathematics favor concentration by creating meaningful learning, this being an effective and flexible option, which allows students to have autonomy and decide when and how to access content that is given simply and concretely, thus improving the virtual education experience and capturing students' attention.

Microlearning strategies in mathematics favor concentration by creating meaningful learning, this being an effective and flexible option, which allows students to have autonomy and decide when and how to access content that is given simply and concretely, thus improving the virtual education experience and capturing students' attention.

Concentration is one of the fundamental skills in the process of acquiring knowledge. Without attention and concentration, it is almost impossible to carry out meaningful learning processes; Therefore, the procedures for high school students to increase their concentration should be oriented to combine methodological strategies such as microlearning, with social interaction and new technologies, leaving behind traditional methods, looking for new ways of teaching and learning that are capable of retaining and attracting the attention and concentration of students differently. Always taking as references dialogue, evaluation, and empathy in educational processes.

Teachers have had successful experiences in the application of microlearning strategies that have positively influenced the concentration of students in the current context of virtual education, for which they recommend constant interaction with students, empathy, simple language, being concrete content, follow a sequence, create spaces for participation, relate mathematics to daily problems, have patience for these new modalities that have meant a challenge for all involved and propose future research regarding the implementation of this methodology, to have greater results that allow the improvement of teaching-learning processes.

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Karen Corral: conceptualización, investigación, metodología, administración del proyecto, recursos, software, supervisión, validación, visualización, escritura - preparación del borrador original, escritura - revisar & amp; edición.

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