Ciencia Latina
Revista Multidisciplinar

DOI: https://doi.org/10.37811/cl_rcm.v7i1.4711

Towards the development of learning through microlearning

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Artículo recibido 05 diciembre 2022 Aceptado para publicación: 05 enero 2023
Conflictos de Interés: Ninguna que declarar

Cómo citar: Zamata-Aguirre, H. R., Choquehuanca-Quispe, W., Machaca-Huamanhorcco, E., Salas Begazo, A. N., & Bernedo Málaga, V. W. (2023). Towards the development of learning through microlearning. Ciencia Latina Revista Científica Multidisciplinar, 7(1), 3939-3954. https://doi.org/10.37811/cl_rcm.v7i1.4711

ABSTRACT

This research is referred to the application of a methodology called microlearning that included the creation of content pills or capsules which provided the student with learning accessible at any time and in any place thanks to its ubiquity and virtual context, for the application of microlearning an instructional design was followed that helped to improve the pedagogical practice. The main objective of this research was to determine how the use of microlearning influences learning in the area of Social Science in secondary school students. This study had a quantitative approach, experimental design, pre-experimental level, where students in the third grade of secondary school in Peru were taken as a sample. For data collection, survey techniques were applied in order to compare academic performance with respect to the pre- and post-test of the application of microlearning. The results of the study revealed that microlearning had a satisfactory influence on learning in the area of social sciences since this learning methodology is easy, accessible, flexible, ubiquitous and didactic, showing that it can be a great didactic resource for the teacher in the teaching of the area.

Key words: *microlearning; learning pill; social sciences; students.*

Hacia el desarrollo del aprendizaje a través del microaprendizaje

RESUMEN

Esta investigación está referida a la aplicación de una metodología denominada microaprendizaje que incluyó la creación de píldoras o cápsulas de contenido que le brindaron al estudiante un aprendizaje accesible en cualquier momento y en cualquier lugar gracias a su ubicuidad y contexto virtual, para la aplicación del microaprendizaje en un ámbito instruccional. Se siguió un diseño que ayudó a mejorar la práctica pedagógica. El objetivo principal de esta investigación fue determinar cómo el uso del microaprendizaje influye en el aprendizaje del área de Ciencias Sociales en estudiantes de secundaria. Este estudio tuvo un enfoque cuantitativo, diseño experimental, nivel preexperimental, donde se tomó como muestra a estudiantes del tercer grado de secundaria del Perú. Para la recolección de datos se aplicaron técnicas de encuesta con el fin de comparar el rendimiento académico con respecto al pre y post test de la aplicación del microaprendizaje. Los resultados del estudio revelaron que el microaprendizaje influyó satisfactoriamente en el aprendizaje en el área de ciencias sociales ya que esta metodología de aprendizaje es fácil, accesible, flexible, ubicua y didáctica, demostrando que puede ser un gran recurso didáctico para el docente en la enseñanza. del Area.

***Palabras clave**: microaprendizaje; píldora de aprendizaje; ciencias sociales; estudiantes.*

1. INTRODUCTION

Given the context caused by the COVID-19 pandemic, we are living a change in our lives such as, for example: the suspension of face-to-face classes, social gatherings, unlimited trade, work from home, etc. this situation in the educational field has made us rethink in new ways to develop the teaching-learning process and even more so in the area of social sciences by involving the management of different sources of information. Given this need, the usefulness of technology in the educational field can serve to improve learning, evidence of this is the implementation of new methodologies, one of them is microlearning or microlearning, which is perfect for learning in a fast, flexible and ubiquitous way; it goes hand in hand with informal learning and mobile e-learning (M-Learning). Technology for its particular characteristics is an ally of microlearning that for its flexible characteristics to involve and motivate learners outside the classroom (Alqurashi, 2017; Anil Job & Slade Ogalo, 2012) offers and provides knowledge in small fragments, in this sense mobile devices allow learning to take place at any time and place as well as the personalization of the same so they can improve the interaction in a synchronous and asynchronous way, enhancing student-centered learning in order to enrich the process with multimedia elements.

Recent research points out that the use of microlearning methodology is favored by the rise of mobile devices that influence the way of personalized learning (Trabaldo et al., 2017) therefore its use can be an ideal way for teachers to reinforce different concepts, strengthen students' motivation and improve the development of academic achievements by offering information in formats that are related to leisure and fun as they allow viewing the content from any device with internet access and repeating it as many times as necessary (Crespo Miguel & Sánchez-Saus Laserna, 2020). This methodology also known as educational or learning pills has become a practical, dynamic, motivating and attractive resource in an m-Learning environment that teachers use to concentrate relevant information about a topic in short lessons, generating the possibility of being easily consulted and stored, as well as increasing the student's attention and motivation. (Conopoima Moreno & Ferreira Lorenzo, 2021; Ibrahim et al., 2012). Studies show that it is more interesting to teach and learn the content in small, very specific bursts that present the didactic content in fragments to visualize them ubiquitously, allowing the student to access them at his own pace through online platforms such as

social networks, YouTube videos, infographics, etc., making it possible to develop a more interactive and interactive learning experience. (Emerson & Berge, 2018; Jomah et al., 2016; Salinas & Marín, 2015; Wang et al., 2021) enabling the development of a "just in time" learning modality that makes it possible to meet multiple needs in a short time. (Rivero Panaqué & Soria Valencia, 2021) allowing the valuation of mobile education for being flexible and accessible, particularly during the COVID-19 pandemic, whose characteristics can strengthen the development of the cognitive footprint and improve retention, promoting the assimilation of knowledge and skills by generating habituation for learning, since the student decides what and when to learn. (Jomah et al., 2016; Muñoz-Organero et al., 2012; Triana et al., 2021) breaking the limitations of time and space, while satisfying the psychological needs of students in the digital era, so it can be considered a new model of online knowledge acquisition. (Liang et al., 2018)

On the contrary, studies by Wang et al. (2021) pointed out that the use of microlearning has little impact on learning outcomes and that this methodology is not applicable to all types of learning objectives and can be limiting in the sense that it only uses fragments of information, so it can be combined with "macrolearning", e-learning strategies for learning of longer duration and volume of content. (Trabaldo et al., 2017) therefore it may not achieve significant improvements in academic results, but it can achieve more meaningful learning. (Alvarez Saiz, 2019)

As can be seen, there is controversy about the use of microlearning methodology as well as different perspectives on its effect on academic performance and other aspects related to the teaching-learning process, and there is an absence of studies related to the use of this methodology in the area of social sciences, Considering that teachers face several challenges in the context of the pandemic and the demands of the megatrends, the present study aims to determine how the use of microlearning influences learning in the area of social sciences in secondary school students as well as to establish the impact of the use of microlearning in this area.

2. MICROLEARNING

Technological advances have taken a great relevance in all sociocultural changes by opening possibilities of innovation in the educational field in order to improve learning. (Belloch, 2012; Marqués Graells, 2000) This is why new strategies have been implemented, one of them is microlearning or microlearning, which goes hand in hand

with informal learning and mobile e-learning, improving didactic interaction in a synchronous and asynchronous way. (Brazuelo Grund & Gallegos Gil, 2011). an excellent ally for teachers and students.

Employing the words of Anil and Slade (2012) y Jomah et al. (2016) microlearning is based on the idea of developing small chunks of learning content that can be understood in a short time and that allow learners to access them easily, generating small bursts of training materials that empowers comprehension in a short time because of their short duration and viewing anytime, anywhere (Amarpreet-Singh et al., 2020; Salinas & Marín, 2015). This methodology allows the teacher to structure the learning contents combining different methodologies oriented to flexibility, active work and student autonomy which are designed to achieve specific knowledge results by providing clear and concise information. (Acuña, 2018; Emerson & Berge, 2018)..

The capsules or micro contents will contain concrete topics that will be consumed quickly and easily, allowing learning to take place in small steps, which will connect to a broader and deeper knowledge in the long term, enabling its use in different environments so it can be called a practical innovation for lifelong learning by making the achievement of learning objectives feasible (Buchem & Hamelmann, 2010) as well as adapting to the needs of learners (Gabrielli et al., 2006; Zhang & West, 2019)..

According to the authors, microlearning will be characterized by being ubiquitous and accessible, which means that it can be used at any time and in any place, even in leisure activities, as it promotes motivation through electronic devices and predisposes to learning. (Beaudin et al., 2006; Camacho Martí, 2011; Gómez Torres & Pulido Hernández, 2018).

3. INSTRUCTIONAL DESIGN

An instructional design is a systematic and structured process, which aims to create experiences that will help students achieve learning.

Acuña (2018) proposed a series of steps to plan content capsules or pills using the microlearning or microlearning strategy, which are:

- Step 1: Determine the learning need

  Step 2: Set the learning objective, it is recommended to create only one objective per content capsule.
- Step 3: Structure the content, short lessons with a single topic should be created.

- Step 4: Develop the pill using ICT

  Step 5: Apply the content, the content should be applied through learning sessions where the student can visualize and practice how to apply this new content in their environment.
- Step 6: Verify learning, incorporate assessments to verify that learning has been achieved.
- Likewise Trabaldo et al. (2017). proposes some recommendations for designing microlearning capsules effectively:
- Define learning objectives
- Hierarchize content and prepare a table of contents
- Create short lessons with a single topic
- Present concepts and how to apply them
- Incorporate a test to measure the effectiveness of the capsule.

In addition, Brazuelo Grund and Cacheiro González (2015). state that at the time of didactic design, the priority and relevant knowledge to be chosen should be taken into account and at which moments the learning will take place for mobility situations.

4. SOCIAL SCIENCES AREA

Social demands have become priority needs for education as it seeks to form critical citizens in the face of social, economic and environmental problems, which is why the area of social sciences is relevant in education.

Taking into account the approaches of MINEDU (2016) the area of Social Sciences allows students to form active citizenship and assume roles as agents of change of social reality through the management of environmental and economic resources, therefore they are linked to the experience with the environment in order to achieve significant learning. (Díaz & Hernández, 2010; Palacios & Ramiro, 2017).Therefore, it involves the development of the following competencies: construct historical interpretations, responsibly manage space and the environment, and responsibly manage economic resources.

The learning of social sciences is constantly changing, which is why teachers have been forced to adapt to new challenges, developing learning strategies that are much more interactive and focused on virtual environments, because if we put them into practice

and merge them with new pedagogical trends, the learning process could be better and more meaningful.

5. METHODOLOGY

The research used the quantitative experimental design approach at the pre-experimental research level to achieve the objectives of determining how the use of microlearning influences learning in the area of social sciences in secondary school students, as well as to establish the impact of the use of microlearning in this area.

This research was developed considering a population of 47 students of third year of secondary education in southern Peru, and a non-probabilistic sample of 13 students because it is a pre-experimental study. The experiment took place during the school year 2021 in the development of a learning experience that lasted approximately one month (from August 23 to September 17, 2021) and consisted of 10 virtual learning sessions using microlearning, for the application of this plan was taken as a reference to Acuña (2018) which proposes an instructional design that served as a guide to elaborate the planning of the sessions. The application of the program was contextualized by the Covid-19 pandemic so the learning sessions by biosafety provision and adequate use of data and connectivity of the actors and educational agents of the Educational Institution had a limited duration of 30 minutes, for which the microlearning acted efficiently by the ubiquitous characteristics it possesses also the content pills were short and simple in the format of infographics, videos and audios and were shared by WhatsApp. The microlearning program was applied through short term times where the content pills were presented and explained by the teacher, this explanation was developed in a maximum period of 15 minutes, then the teacher invited the students to study the content pill for evaluation and respective feedback.

The survey technique was used; for the independent variable, a questionnaire was used as an instrument that was applied at the end of the learning experience, while for the dependent variable, the questionnaire instrument was used before and after the intervention (pretest and posttest) to determine the change resulting from the experimental treatment. Cronbach's alpha 0.99 and review by experts from leading local universities were used to measure the reliability of the instrument. The questionnaire for the microlearning variable had 20 questions with likert scale and for the learning variable it consisted of 20 multiple choice questions.

In order to execute the intervention based on the use of microlearning, permission to conduct the research was requested from the director of the educational institution involved, the sessions were developed through google meet and under the instructional design the microlearning methodology was applied, the content pills as well as the research instruments were shared through the educational WhatsApp group of the area, the researcher collected the pre-test and post-test data to determine if the use of microlearning influences learning in the area of social sciences.

6. RESULTS

The normality test evidences the acceptance of the alternative hypothesis raised in the research, microlearning will positively influence learning in the area of social sciences in students of the third year of secondary education, applying the Wilcoxon Signed Ranks statistical test since the Z(cal) value of -2.248 is lower than the Z of 1.960 defined (Z_1 - ∞/2) and the p-value of 0.012; therefore there is sufficient statistical evidence to reject the null hypothesis and the alternative hypothesis is accepted, demonstrating that there is an improvement in learning after the intervention. Therefore, in the comparison of the results of the pre-test and post-test of the learning variable, it was found that before the intervention, the students' learning grade was located on average between 8 and 15 points, according to the achievement levels in regular basic education in Peru established by the Office of Measurement of the Quality of Learning (2016). The students were at the pre-beginning, beginning and in process levels; no student was at the satisfactory achievement level. Once the microlearning methodology was applied, significant changes were found, the students' grades improved considerably from 11 to 19 points, which represents the beginning, in process and satisfactory achievement levels. These results mean a considerable improvement in the learning process of the students evaluated after the intervention, which is why it can be affirmed that this methodology improves the learning process and academic performance.

Regarding the results of the application of the questionnaire in relation to the microlearning variable, it was found that 61.5% of students strongly agree that the application of the methodology is appropriate for learning, and 76.9% of them strongly agree that the design of microlearning helps to improve their learning, so it can be said that most of them consider that the application of this methodology favors learning through the use of fragmented content in small content capsules that favor quick and

effective comprehension. Regarding the use of microlearning as a facilitator of understanding in the area of social sciences, 46.2% strongly agree that through the use of microlearning the process of understanding the area of social sciences is facilitated and 38.4% expressed agreement, making a total of 84.6% of students who consider that effectively the use of microlearning helps to improve the understanding of students in the area of social sciences evidencing that the implementation of microlearning strategies helps to develop knowledge. On the other hand, 46.2% of the students strongly agreed that microlearning can help to learn at any time and in any place that the student decides to do it and 38.5% agreed, showing that a total of 84.7% of students are looking for learning tools that can be adapted to their time and place, a need that has proliferated in times of pandemic and that can be assumed by the advantages offered by microlearning promoting a friendly learning experience according to the demands of today in terms of ubiquity.

7. DISCUSSION

Regarding the hypothesis testing the results found in the analysis according to the Wilcoxon Signed Ranks statistical test with the Z(cal) value of -2.248 which is less than Z of 1.960 defined (Z_1 - ∞/2) and the p-value of 0.012; it is evident that if there is improvement in learning after the intervention this is in contrast with the results of pre-test and post-test that evidenced significant effects in the levels of achievement reached, regarding the objective of establishing the impact of the use of microlearning in the area of social sciences it was found that most students consider that the application of this methodology favors learning and facilitates understanding in the area of social sciences evidencing that the microlearning methodology help to develop knowledge.

The aforementioned in the previous paragraph is corroborated by the studies of Conopoima Moreno and Ferreira Lorenzo (2021) who in their study conducted with university students in Ecuador used the microlearning methodology from an instructional design approach finding that 93% of students were satisfied with the use of the methodology evidencing a positive assessment in addition the experience showed that the application made it possible to address different content in a fast way, we agree with the study as the practicality of the methodology mediated by the instructional design facilitated to focus learning on content pills which in turn generated motivation and greater learning by the ubiquitous disposition. Similarly, a study in Libya Jomah et al.

(2016) conducted a study in Libya finding that 80% of respondents seek a simple and intelligent learning system and microcontent as well as 81% believe that microlearning is the best learning system for PLE (personal learning environment), followed by 66% of respondents whose opinion is that dynamic applications of microlearning enhance knowledge. In addition, Ibrahim et al. (2012) in its exploratory study conducted with students at a university in Malaysia concluded that learning pills promote increased student motivation and induce them to engage in learning habits. Also Triana et al. (2021) in his study with higher education students in the United States found that 91.6% were satisfied or very satisfied with the microlearning experience and 89.5% agreed or strongly agreed that the activity informed and/or reinforced practice habits, demonstrating that microlearning is feasible and scalable as well as preferred by the majority of students compared to traditional methods of continuing education. Likewise Muñoz-Organero et al. (2012) in their experimental study with higher education students in Spain found that the attendance rate increased to 56% thanks to the delivery of learning pills in classes, impacting in turn on the average grades from 4.7 out of 10 to 5.2 out of 10, concluding that the use of learning pills has a positive impact on the evolution of the motivational states of students throughout the course, coinciding with the studies by Liang et al. (2018) who in their study conducted in China used the ontology method to represent and manage all types of knowledge in the modeling of user profiles considering microlearning, concluding that the widespread use of technology and mobile devices enables the dissemination of fragmented knowledge, this being a new model of online knowledge acquisition that facilitates the aggregation of individualized knowledge for users.

On the other hand, the inquiry of Wang et al. (2021) in his exploratory case study with higher education students in China determined that 50% of the students reported finding the learning outcomes barely satisfactory, coinciding with Álvarez Saiz (2019) who in his study with university students in Spain concluded that the microlearning methodology did not achieve a significant improvement in academic results, however, the students felt that they achieved more meaningful learning, as supported by Trabaldo et al. (2017) in his study by pointing out that the microlearning methodology is not applicable to all types of learning objectives because it can be limiting in the sense that it only uses fragments of information.

As stated in the aforementioned studies, virtual education is becoming increasingly relevant either due to new pedagogical trends or the rise of electronic devices, which is why, if these resources are properly used, microlearning and microcontent will play a key role in education, providing personalized learning opportunities that will be available anywhere and can be consumed at any time.

In general, the research is consistent with previous studies, these results are associated with the effects obtained after the intervention so that microlearning is a tool that can be used by teachers to achieve excellent levels of achievement by allowing rapid learning in less time achieving better channels of motivation as ratified by Acuña (2018). who states that microlearning is appropriate since it improves student learning, achieving the development of competencies by promoting self-evaluation and reflection that facilitate the improvement and understanding of learning using microcontents.

A limitation of this study is that because it was pre-experimental it did not have a control group, however, the results of this research study are vital for further investigation of the factors that may influence microlearning mediated learning.

8. CONCLUSIONS

The microlearning methodology is relevant in its application if it follows an instructional design, with didactic resources, use of ICT and gamification to motivate the student.

The use of microlearning influenced the learning process of social sciences in the students of the VII cycle, who achieved an increase and attainment of competencies.

It was demonstrated that microlearning helped to improve the academic performance of students in the area of social sciences, being effective in its application, improving learning time considerably by being accessible anytime and anywhere thanks to mobile e-learning.

The majority of the students surveyed consider that their learning is benefited if the teacher uses microlearning as a methodology and didactic resource, since they stated that their learning is opportune if microlearning and microcontents are applied during the learning experiences.

Finally, we propose the development of future studies with an experimental design, at a quasi-experimental level, to provide the scientific knowledge necessary to analyze whether pedagogical innovation mediated by microlearning influences the teaching-

learning process, in addition to exploring educational resources and materials in synchronous and asynchronous environments that fulfill the functions of learning pills.

CONFLICT OF INTEREST

The authors declare that they have no conflicts of interest.

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