

Use of technological strategies as an educational policy of continuity in the university academic process
Uso de estrategias tecnológicas como política educativa de continuidad en el proceso académico universitario.

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Abstract

There is a need to know the basis of the use of technological strategies and to apply them in a particular case in the teaching of Mathematics; therefore, the general objective of the research is to explain the importance of the use of technological strategies as an educational policy of continuity in the university academic process. The study is based on the historical hermeneutic paradigm of mixed approach. The method used was logical inductive, and the research is explanatory. A careful tracking of documentary information was carried out in which the use of technological strategies as an educational policy of continuity is addressed. On the other hand, it had a pre-experimental design in the achievement of Mathematics skills using technological strategies, such as video tutorials. The fundamentals of the use of technological strategies are investigated, analyzing the use and benefits presented in the virtual modality in university education in the area of Mathematics. The results indicate that the use of technological strategies should be considered as an educational policy of continuity in the university educational process, since they contribute to the development and continuous improvement of education in the area of Mathematics in the country. The results also indicate that the evaluation of the contents of Mathematics and the opinion of the teachers were favorable to the use of the technological strategy in their teaching practice in the reality of the Pandemic COVID-19. The conclusions obtained report high predisposition of the participants to the use of the digital technological strategy, a high percentage of very favorable opinion of the teachers who conducted the subject of Mathematics through the use of appropriate technological strategies and this corroborates the foundations exposed by various authors consulted.

Key words: strategies, policy, education, virtual modality, university.

Resumen

Existe la necesidad de conocer los fundamentos del uso de las estrategias tecnológicas y aplicarlos en un caso particular en la enseñanza de la Matemática; por lo que la investigación tiene como objetivo general explicar la importancia que tiene el uso de estrategias tecnológicas como política educativa de continuidad en el proceso académico universitario; el estudio se apoya en el paradigma histórico hermenéutico de enfoque mixto. El método utilizado fue lógico inductivo, la investigación es explicativa, se ha realizado un rastreo cuidadoso de información documental en los cuales se aborda el uso de estrategias tecnológicas como política educativa de continuidad. Por otra parte, tuvo un diseño pre experimental en logro de capacidades de la Matemática utilizando las estrategias tecnológicas, como el video tutorial. Se investiga los fundamentos el uso de las estrategias tecnológicas, analizando la

utilización y beneficios que presenta en la modalidad virtual en la educación universitaria en el área de Matemática. Los resultados indican que el uso de las estrategias tecnológicas debería ser considerados como política educativa de continuidad en el proceso educativo universitario; dado que contribuyen al desarrollo y mejora continua de la educación en el área de Matemática en nuestro país. Se ha obtenido como resultado de la evaluación de los contenidos de los Matemática de los participantes que estos han mejorado y la opinión de los docentes fue favorable al uso de la estrategia tecnológica en su práctica docente en la realidad de la Pandemia COVID-19. Las conclusiones obtenidas fueron: Una alta predisposición de los participantes al uso de la estrategia tecnológicas digitales, un alto porcentaje de opinión muy favorable de los docentes que condujeron la asignatura de Matemática mediante el uso de las estrategias tecnológicas apropiadas y esto corrobora los fundamentos expuestos por diversos autores consultados.

Palabras clave: estrategias, política, educación, modalidad virtual, universidad.

1. Introduction

The use of didactic strategies in the virtual modality as a university educational policy currently constitutes a priority element in the development of a nation's education. That is the importance of being considered within the agenda of each of the different countries that make up the world. Approved educational policies are decrees or laws that establish explicit norms and guidelines for the educational field in a given country (Malagón, Rodríguez, & Machaca, 2019).

At present, society and education must maintain a relationship of convergence, since the changes that occur in society are reflected in education; however, society is currently subject to rapid transformations of both scientific, technological and sociocultural character and the strategic use of a wide range of information which generate access to the acquisition of knowledge (Rios-Cabrera & Ruiz-Bolivar, 2020). A great number of universities in Europe and America offer university education through the distance modality making use of the Information and Communication Technologies (ICT) within their educational process (Falcón, 2013).

In the Latin American scenario of curricular changes due to social demands and the era of knowledge, issues are addressed regarding the implementation of systems that seek to ensure educational quality, through an academic offer, which offers the necessary conditions of the programs presented by universities in their educational services, administration and institutional flexibility, to provide attention and adaptability to social demands (Malagón, Rodríguez, & Machaca, 2019).

However, there is still a gap between education and society that cannot be bridged with a conventional alternative solution based on transformations carried out in a partial way with respect to the organization of the educational system (Cuenca & Urrutia, 2019). It is necessary to use strategies to gradually reduce these gaps in order to find a fairer balance between what today's society demands and the quality of education, understanding that the strategies are nothing more than innovation, which should seek structural change of the traditional education system. For this, public educational policies are required to be reoriented to generate optimal conditions in the educational system, guaranteeing the execution of innovation processes that support the improvement of educational services (Rios-Cabrera & Ruiz-Bolivar, 2020).

In the context of the fragmentation of educational proposals, measures have been promoted to introduce modifications in the face of this situation (Homar & Dalinger, 2019). Policy studies generally aim to reconstruct and consequently evaluate the different moments applied in decision making that begin with the definition of the problem and the formulation of the agenda, passing through the design and implementation process (Del Castillo & Flores-Ivich, 2019). Such public policies are linked to a range of interdependent resolutions that are taken by political figures that involve clearly defining the objectives and resources for their realization within the framework of a situation. It can also be stated that this set of interdependent collective choices is associated with the decisions made by governments and their representatives (Malagón, Rodríguez, & Machaca, 2019).

Advances in science and technological innovation have a great impact on society, as evidenced by the different inventions that have been made in the last few years (Rios-Cabrera & Ruiz-Bolivar, 2020).

2. Presence of ICT in the teaching-learning process.

In the above context, the incorporation of Information and Communication Technologies (ICT) in education arises and continues to be a priority topic of interest for the different governments (Prettel & Cantillo, 2016). In the educational sector, technological advances are used by current generations and this generation is immersed and familiar with the use of digital media. In this reality, teachers face new challenges that forces them to take advantage of these potential technological advances in their work (Rodríguez, López, & Mortera, 2017).

The use of current technological media in the educational field breaks the paradigm of conventional teaching practice, due to the ways of interacting with students, the delivery of materials, resources, development of activities, among others (Rodríguez, Lopez, & Mortera, 2017). Consequently, studies show how the use of these technologies supports the development of educational projects whose purpose is to impart knowledge to improve learning problems, achieve the transformation of the needs of the social, cultural, economic, political or environmental context in which educational institutions are immersed (Prettel & Cantillo, 2016). Among other beneficiaries of the use of ICTs by teachers in the teaching-learning process, it allows them to improve their pedagogical production (Prettel & Cantillo, 2016) and allows students to perform their educational activities in an interactive way through the use of multimedia such as video, audio and text in a natural way to build their skills in different subjects.

The use of technological strategies as an educational policy is allowing to close the gap between teacher and student; forcing both to become familiar with and obtain the benefits offered by technology in education, such as graphic tablets and mobile devices to design educational videos (Moncayo, 2019). Video games are a didactic resource that could mediate the teacher and the student to better develop the teaching-learning process, since they offer skills closely related to the process of scientific knowledge construction. (Rodríguez, Mansanilla, Peña, Occelli, & Ramírez, 2020).

Little by little, in the last decades, technological culture has been leaving traces in the classrooms and the audiovisual world represented by video, computers and the Internet is becoming a main part of the usual resources used by education professionals in their teaching practice (Fernández-Rio, 2018) and the message can be made even easier, more attractive and motivating for the students (Fernández-Rio, 2018). The fundamental task is for the teacher to be the "producer of the content", for which he/she needs to achieve the new competences (Falcón, 2013) and (Fernández-Rio, 2018). That is why educational videos are considered motivational resources because they help to solve difficulties in plausible environments, placing the students in a dynamic environment (Rodríguez, Mansanilla, Peña, Occelli, & Ramírez, 2020). They are considered, according to (Jiménez, 2019) as very complete audiovisual media because they integrate moving images with sound, responding to the needs of each individual. On the other hand, (Zambrano, 2019) stated that educational videos are didactic media that have a didactic objective previously formulated by the teacher.

The development of audiovisual products, which are video tutorials, present a high degree of complexity or go through a set of very demanding processes on the part of those who build them (Tavera & Ramírez, 2019). However, making educational videos helps to know and understand both the teacher and the content that the teacher guides, so the introduction and use of videos as resources of educational technological strategies in the teaching-learning process becomes one of the challenges for innovative teachers (Moncayo, 2019). The use of these educational resources is conducive to distance or remote education, in which users of a virtual network that promote learning can conduct discussions and reach consensus on their own learning. These resources have advantages that are manifested in the management of the technological media strategy and always have the contents developed, since the student can review the educational videos as many times as he/she deems convenient, keeping his/her concentration at all times (Rodríguez, Lopez, & Mortera, 2017).

It is necessary to mention that many videos are found on the network and allow to be used freely, facilitating their use, modification and adaptation by users, as long as the credit goes to the original author and the types of licenses that allow (Rodriguez, Lopez, & Mortera, 2017). It is also important to mention that the development and implementation of educational videos of a subject and more, has different benefits in educational processes (Rodriguez et al., 2017). On the other hand, it becomes an educational innovation, which consists of the art of applying them in new conditions, in a specific context and with a precise and well-defined objective (Tremarias & Velásquez, 2009).

According to (Jimenez, 2019), the use of these pedagogical resources awakens the interest of students, thanks to the great wealth of animations and sounds that they possess, helps the assimilation and retention of content, helps in the improvement of learning, frees repetitive and routine work. In university classrooms, classes are developed to generate real, virtual and interactive environments and dynamics for the achievement of the learning of the subjects studied by the students in their study plan.

Educational videos have the ability to transmit an orderly, structured, sequential and complete educational content; these resources are elaborated to understand and retain their content, due to their easy assimilation and retention of the planned knowledge. Educational videos should support the teacher's discourse but not replace it (Cebrián, 2017). For their part, (De la Fuente, Hernández, & Pra, 2013), the authors of the study stated that the functions of videos in educational contexts depend largely on their bidirectional nature and their self-sufficiency in the presentation of their content; therefore, they can be used as a source of information, a way of learning, a tool for evaluation or as a means to carry out research.

(Cabero & López, 2009) express that "Evidently there has been more progress in the technical design of the virtual classroom, on which there seems to be a broad consensus, than in the field of the teaching processes to be implemented in them". (p.23)

3. Methodology

3.1. Setting the problem

The objective of the study was to know the influence of digital technological strategies in the achievement of Mathematics skills in the first study cycles of the university that trains educators for the different educational levels of the country, given that low results of achievement of competencies in the first mathematics courses are frequently presented. In order to specify the study problem, a survey was applied to 14 teachers in charge of teaching the subject in the last five academic semesters. The results were as follows: 90% of teachers do not have digital didactic materials, such as video tutorials and are only supported with bibliographic material and handouts; 80% of university students have technological means of communication to receive their classes remotely. Therefore, the research problem was posed: How does the use of digital technological strategies influence the achievement of mathematics skills in students? and the objective was to prove that the use of digital technological strategies influences the achievement of mathematics skills. The use of methodologies based on video tutorials presents an effect that contributes favorably in the academic performance of students, considering conceptual and procedural knowledge (Gonzales, 2018).

3.2. Research design

The research addresses the fundamentals of digital technological strategies used in the classroom. The research design was pre-experimental, evaluated before and after; the questionnaire aimed to measure their attitudes in the achievement of Mathematics competencies in the students of the experimental group. Likewise, a questionnaire was applied to the lead teachers of the Mathematics subject.

3.3. Sample

The study sample consisted of 100 students and 12 teachers, both of whom were purposively selected.

3.4. Procedure

The teachers developed the mathematics course using digital technological strategies, such as video tutorials for each content of the course. At the beginning and at the end of the course, a 12-item

questionnaire was applied to the students, to know the achievement of capabilities of the Mathematics contents, and at the end of the course, a survey was made to the teachers about their experiences in the classroom they were in charge of.

4. Results

The results of the Mathematics achievement measure are presented in Table 1 and Figure 1.

Table 1 Range of level of capabilities

Levels	Ranges	Frequency Entry	Frequency Exit
Low Level	[0, 4]		0
Medium Level	]4, 8]		5
High Level	]8, 12]	0	

Source: Own elaboration

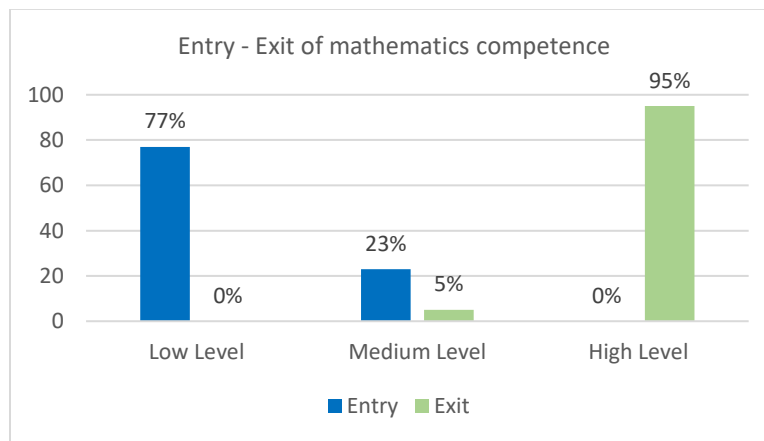


Figure 1. Entry - Exit of mathematics competence

The results show that before starting the course, the students did not have mastery of the Mathematics subject competencies; 77% of the students presented a "Low" level of knowledge and only 23% presented a "Medium" level of knowledge. After completing the study of Mathematics through the use of digital strategies, 95% obtained a "High" level of knowledge and only 5% presented a "Medium" level of knowledge; which shows that the use of digital strategies in the classroom allows to obtain better results in the achievement of Mathematics competencies.

Table 2 Teachers' opinion on the use of digital strategies in the classroom

Levels	Ranges	Frequency Entry	Percentage (%)
Very good	]39,48]		58.33
Good	]30, 39]		33.33
Regular	]21, 30]	1	8.33
Mala	]12, 21]	0	0.00

Source: Own elaboration

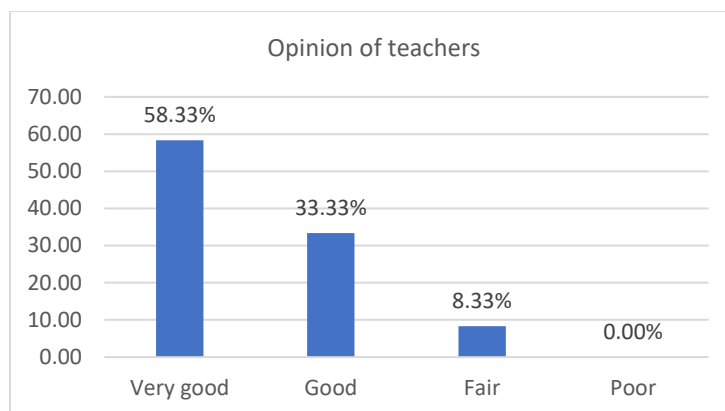


Figure 2. Use of the digital material strategy in the classroom

Regarding the opinion of the teachers about the digital strategies used, 53% think that it has been "Very good" and 33% affirm that it has been "Good" and 8.33% think that it has been "Regular". In all cases the use of the digital strategy as an educational policy for the continuity of the students in the university has been positive.

3. Conclusions and Final Reflections

The present study has shown that incorporating technological resources as didactic strategies in the teaching-learning process contributes to the achievement of students' competencies; even more so, if these resources are the educational videos elaborated by pedagogues, which combine sounds and images, making them attractive to the sight and hearing of the users, thus facilitating that the educational continuity is carried out in a harmonious, dynamic and attractive way.

Educational videos are considered didactic resources which allow for a better teaching-learning process. They are also important support resources for the teacher because they help to improve his praxis. Furthermore, they help the student to consolidate his learning in a natural way by increasing his will, attention, concentration and assimilation of the content of the subject.

Students who use educational videos in their learning process in the subject of Mathematics at university achieve better academic results because they are permanently motivated.

Regarding recommendations

University teachers should be continuously trained in the use and development of educational videos so that they can incorporate them into their teaching practices.

University teachers must use digital pedagogical resources in the development of the teaching-learning process in the subjects they are in charge of in order to contribute to the improvement of educational services and ensure the continuity of university students, in the reality of the remote classes they face.

University students should make use of educational videos to consolidate and improve their knowledge and self-manage their own learning, according to their possibilities and time availability, repeating as many times as necessary until they achieve the required competencies in Mathematics.

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