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Artículos científicos

Uso de una app como apoyo para el aprendizaje de operaciones fraccionarias en alumnos de nivel básico durante la pandemia de covid-19

Use of an App to Support the Learning of Fractional Operations in Elementary School Students During the COVID-19 Pandemic

Utilização de um aplicativo de apoio ao aprendizado de operações fracionárias em alunos do nível básico durante a pandemia de covid-19

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Resumen

Durante la pandemia covid-19 las instituciones de educación de todos los niveles cerraron sus puertas para desacelerar la tasa de contagios y se activaron las clases en línea en todo México. Esto provocó un cambio radical en el proceso de enseñanza-aprendizaje que afectó a millones de estudiantes. En ese contexto se diseñó una aplicación móvil en Android Studio como alternativa de estudio de operaciones fraccionarias para estudiantes de primaria de quinto grado del municipio de Tierra Blanca, Veracruz. En este estudio se busca conocer el impacto que tuvo esta en el proceso de aprendizaje del alumnado. Este proyecto tiene un enfoque cuantitativo con alcance correlacional. La muestra probabilística fue de 353 estudiantes. Para la comprobación de la hipótesis se utilizó una correlación de Pearson en el

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programa estadístico Minitab. Los resultados arrojaron que los estudiantes que utilizaron el recurso informático resolvieron positivamente más ejercicios fraccionarios que los jóvenes que no lo utilizaron.

Palabras clave: aprendizaje, matemáticas, *software* educativo.

Abstract

During the covid-19 pandemic, educational institutions at all levels were closed to slow the rate of infection and online classes were activated throughout Mexico. This caused a radical change in the teaching-learning process that affected millions of students. In this context, a mobile application was designed in Android Studio as an alternative to study fractional operations for fifth grade elementary students in the municipality of Tierra Blanca, Veracruz. This study seeks to know the impact it had on the learning process of the students. This project has a quantitative approach with correlational scope. The probability sample was 353 students. To test the hypothesis, a Pearson correlation was used in the Minitab statistical program. The results showed that the students who used the computer resource positively solved more fractional exercises than the young people who did not use it.

Keywords: learning, mathematics, educational software.

Resumo

Durante a pandemia de covid-19, instituições educacionais de todos os níveis fecharam suas portas para diminuir a taxa de infecção e aulas online foram ativadas em todo o México. Isso provocou uma mudança radical no processo de ensino-aprendizagem que afetou milhões de alunos. Neste contexto, projetou-se um aplicativo móvel em Android Studio como alternativa para estudar as operações fracionárias para alunos da quinta série do ensino fundamental no município de Tierra Blanca, Veracruz. Este estudo procura saber o impacto que isso teve no processo de aprendizagem dos alunos. Este projeto tem uma abordagem quantitativa com um escopo correlacional. A amostra probabilística foi de 353 alunos. Para testar a hipótese, uma correlação de Pearson foi usada no programa estatístico Minitab. Os resultados mostraram que os alunos que utilizaram o recurso do computador resolveram positivamente mais exercícios fracionários do que os jovens que não o utilizaram.

Palavras-chave: aprendizagem, matemática, software educacional.

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Introduction

For a long time, learning mathematics has been considered by students not only a tiring, stressful task that requires great effort (Stelzer, Andrés, Canet, Introzzi, & Urquijo, 2016), but also requires high aptitudes. such as: cognitive abilities, resolution speed, reading comprehension, etc. To counteract this vision, it is extremely important, in addition to correctly understanding and interpreting the teaching of mathematical operations, because within the classroom many situations, both positive and negative, can happen, the correct use of learning environments (Alvis, Aldana and Caicedo, 2019), since they help to potentiate the educational strategies, through observable situations, where reflective knowledge plays a leading role capable of evaluating the consequences of the problematic situations in charge.

The strategies within the classroom are the responsibility of the teachers, who, after a diagnosis at the beginning of the school year, must determine which one to use and which one not. Generally, in the field of mathematical competence, the most common strategies tend to revolve around the interpretation of graphs (Contreras, 2018), since it is more digestible for students and more adapted to their context. It is worth mentioning that a phenomenon that has been present for several years is the dependence of students on the calculator (Guzmán, Ruiz and Sánchez, 2021). Currently, the conventional calculator has been displaced by the digital calculator, which is found in smart cell phones, to which practically the majority of students have access at home or at school. The foregoing marks a dependence, when solving operations, towards digital devices, leaving basic mental calculation operations in the background, which causes a native disadvantage in young people when mentally solving problems in their daily lives of a mathematical nature. . The simple fact of going to the store for purchases demands the resolution of mathematical operations, but if this competence is not developed, the payment process and receiving the corresponding change are difficult, if applicable, since the person should be trained to do mental math.

However, despite all the comments in favor of mental calculations, it is important to say that today an equally important competence is the use of information and communication technologies (ICT), of digital resources (Grisales, 2018). Of course, these types of resources are not a substitute for teaching practice; on the contrary, they are an extension of the

teaching-learning process. Indeed, the components that years ago, in the 90s, began their epic with the word multimedia, have now evolved in such a way that as teachers we have a wide range of educational technological aspects within our reach.

Although, once again, these technologies by themselves do not solve educational problems (Revelo, 2018), but rather need to be adapted to the particular needs of students and the school context. In other words, a misused digital didactic strategy can also bring unpleasant consequences for the learning process. For this reason, today, and because times are continually changing, teachers need to undertake constant reflection on their teaching practice inside and outside the classroom (Hidalgo, 2021). In addition to this, it is not enough just for students to use the educational program, but for the environment to really integrate this process into the expected learning, to put it in a way. In short, along with stimulating the different mathematical skills, it is important to promote computational thinking (Mancinas & Montijo, 2021) that forges the support bases at the beginning of the interaction with fractional exercises that include situation analysis, and thus lead the student to work analytically in their context.

In the use of technologies, the use of mobile phones is increasingly mentioned and within these, even the use of video games to improve the pedagogical aspect in mental calculation and problem solving (Capell, Tejada and Bosco, 2017). The above trend is based on the idea that the students of the new generations already bring from birth, as it is commonly said, the use of technology. Undoubtedly, the task in the classroom also evolves over the years, the learning of our grandparents several years ago is not the same, compared to how our students are learning today. Educational institutions are constantly changing, which is generally subject to technological progress. In addition to this, in other regions of the world, policies have been designed with a pronounced technological aspect in order to establish strong innovation processes with the aim of transversally integrating support systems (Durando and Ravelo, 2020) that allow young people in basic education to be able to assimilate in a more playful way the mathematical processes of their school grid.

The strategies used for teaching mathematics at the primary level include a variety of techniques. Depending on the level at which it is applied, the context, the type of student, the learning environment, etc. must be taken into account, since the teaching of mental calculation in rural areas is not the same as the teaching of calculation. mental in urban areas, the context alone changes all the variables.

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Methodology

The objective of this research is the evaluation of the use of a computer resource, a mobile application designed in Visual Studio, which served as support for the learning of fractional operations in basic level students. This resource is based on the MEAC-TIC teaching-learning method (Salazar and Dolores, 2018), which uses ICT as a support for the study.

The population used in this study were fifth grade students in the municipality of Tierra Blanca, Veracruz. The sampling included a total of 144 primary schools, according to data from the Statistical and Geographic Information System of the State of Veracruz de Ignacio de la Llave (Siegver) 2020-2021, where a total of 4,320 students study. A simple random probabilistic sample was used. The number of the probabilistic sample was 353 students, with a confidence level of 95% and a margin of error of 5%.

During the investigation, due to the 2019 coronavirus disease (covid-19) pandemic, all face-to-face classes were suspended, so the principals of the primary schools were contacted via WhatsApp and cell phones to request the permission of the parents of the selected students for the application of the data collection instrument 1 (Calif_1), which consisted of a test of four fraction exercises. Subsequently, after a week had elapsed, the tutors were contacted again to provide them with a link from which they could download the software on their children's cell phones. Once all the students had the application installed, an hour was taken in the afternoon for the explanation and use of this application for three days. The doubts that some parents had were explained remotely with the help of the Google Meet tool. The next step was to wait two weeks to contact the tutors again and provide them with a new link that contained the data collection instrument 2 (Score_2), which also consisted of four fraction exercises. Data collection instruments 1 and 2 were sent as Google Classroom forms for easy handling.

Results

The computer resource used to learn fractional operations during the pandemic was an app designed in Visual Studio, which was named MatePrim, as shown in Figure 1.

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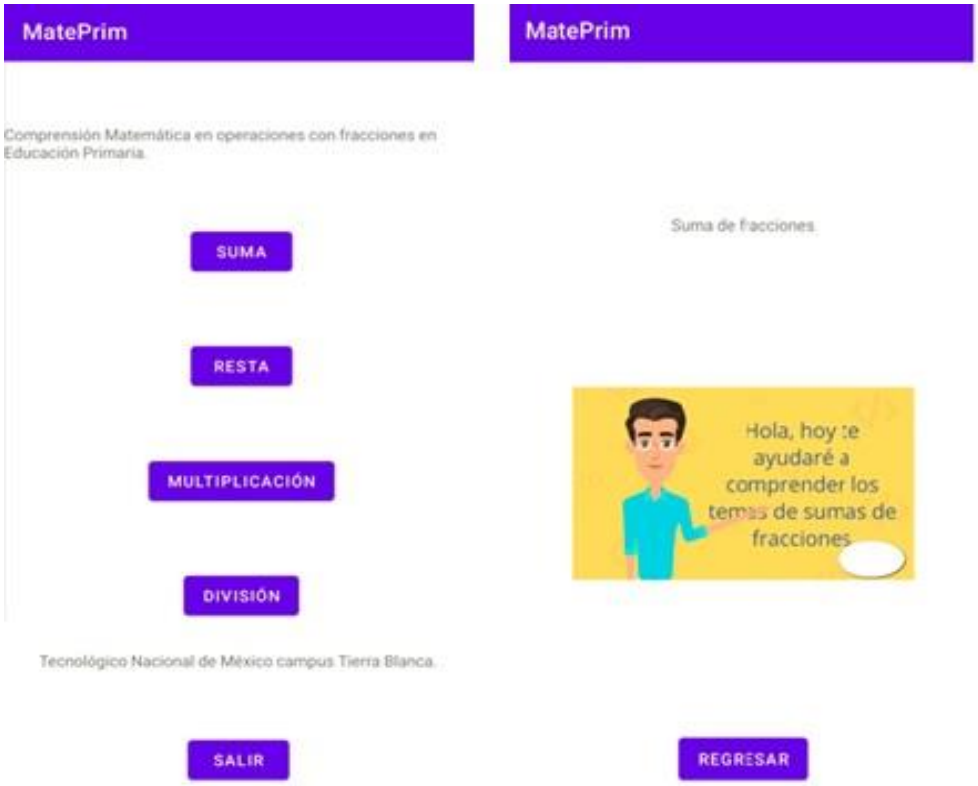
Figure 1. Main screens of the designed computing resource



Source: self made

This application is made up of a main menu, in which four buttons corresponding to the operations with fractions of addition, subtraction, multiplication and division are displayed. Each button displays a subscreen, like the one shown in figure 1 on the right, in which the explanation of an example of operation is found in video format. As can also be seen, there is a return button for the initial menu, visible on each subscreen. Finally, there is an exit button to end the program.

Pearson correlation

The Minitab 16 statistical program was used to execute the results of the first moment qualifications, of the instrument named Calif_1, and the results of the second moment qualifications, Calif_2, and the following was obtained:

- Correlations: Rating_1, Rating_2.
- Pearson's correlation of Qual_1 and Qual_2 = 0.153.
- p-value = 0.004.

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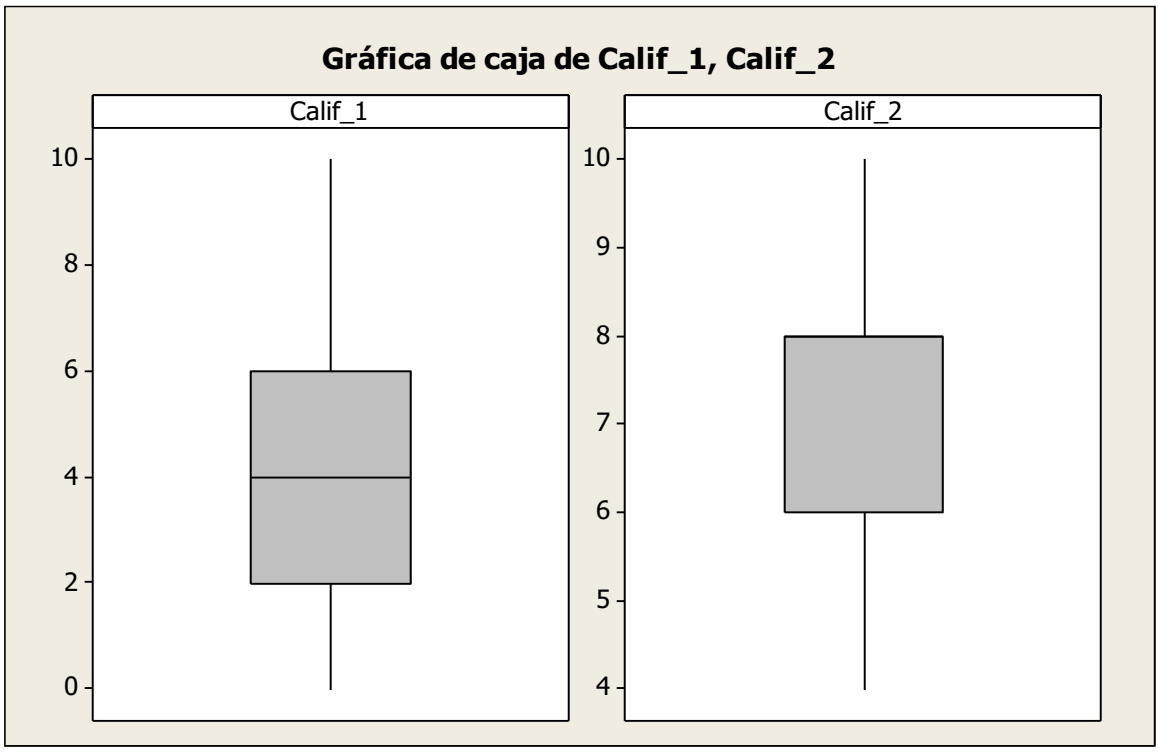
Pearson's correlation was 0.153, which is a very weak positive correlation; and a p value of 0.004 was obtained, less than the significance level of 0.05, which indicates that there is indeed a significant difference between the first and second sample of qualifications, that is, when the students performed the first test instrument. problems and studied in the traditional way obtained a lower score in solving problems compared to the score of the second instrument, by the time they had already studied with the help of the app. This shows that the use of the app as a support resource for the study of fractions did contribute to the resolution of these exercises during that period of time in the pandemic.

Next, in figure 2, a box plot is shown where the increase in grades in the Calif_2 instrument is observed in comparison with the first instrument Calif_1, this is due to the fact that the students used the program for their study of solving fractional exercises computer.

Figure 2. Boxplot of Calif_1, Calif_2 in Minitab 16



Source: self made

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Discussions

The teaching process during the pandemic clearly came to change the educational paradigm that had been used in the classroom. If for some time ICTs in terms of videos (Curto, 2021) have been driving this change, particularly in the mathematical part, playful methodologies such as the Adventure School (Morales and Villa, 2018), which is created for To help better understand these operations with role-playing systems, during the covid-19 pandemic, which caused social isolation, a greater adaptation to technologies was required to carry out distance education, that is, that young people could continue their learning while at home. Thus, it was necessary to resort to computer resources that students could use with the media that parents had at home, for example, cell phones, and the creation of innovative educational proposals such as the one that is part of this research, the creation of an app that was compatible with most devices and easy to use. This provided multimedia aspects of video, sound, and figures so that the student's management and use would not be complicated, installed on his mobile so that he could repeat the session at any time, all this to facilitate the learning of mathematics at a distance.

Conclusions

The use of technology in the classroom has shown a positive boom since the 80s, however, nowadays, with technological advances, a mobile device is already available to practically any parent and their children, which it contains a considerable processing capacity in terms of hardware and software, that is, they can already perform many tasks with it, a student with a mobile can already work with a word processor, slide design, compressed format, photographs, video, access to the internet etc. On more than one occasion it has been proven that computer systems that are designed to help in some academic process benefit all members of the educational community, so fear of change must be lost, assimilation of existing technology and the what is to come An example is the program carried out in this research, which was helpful during the time of the pandemic, since young people, being locked up in their homes due to confinement, had another way of studying, far from the traditional way used in school in person, to all this is added that young students already handle cell phones perfectly, which makes this informatics pedagogical proposal an innovative and relatively easy-to-implement option for the teaching-learning process.

Future lines of action

The results obtained here push to give continuity to this investigation, for all the time of confinement due to the pandemic in Mexico. Similarly, it is recommended that future research projects analyze the use of computer resources through various pedagogical strategies to improve meaningful student learning.

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