






Application of the Geogebra Program in the Learning of Geometry in Students of 4th grade of High School N° 86620 Santa Fe de Tumpa -Yungay, 2018

[Aplicación del Programa Geogebra en el Aprendizaje de la Geometría en Alumnos de 4to año de educación secundaria de la I.E. N° 86620 Santa Fe de Tumpa - Yungay, 2018]

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Resumen

El objetivo de la investigación es determinar la influencia de la Aplicación del Programa Geogebra en el Aprendizaje de Geometría en alumnos de 4° grado de secundaria de la I.E. N° 86620 Santa Fe de Tumpa– Yungay, 2018. La investigación es tipo experimental transversal, método cuantitativo y diseño pre experimental. Se aplicó dos instrumentos: un examen de entrada y otro de salida, a una muestra poblacional de 22 alumnos de 4° grado de secundaria de la I.E. N° 86620 Santa Fe de Tumpa. Se analizaron los resultados después de haberse aplicado el programa Geogebra al grupo único de estudio. Se encontró que sí existe una influencia altamente significativa ($p=0.00001<0,05$) de la Aplicación del programa Geogebra en el Aprendizaje de geometría en alumnos de 4° grado de secundaria en el curso de Geometría, de la I.E. N° 86620 Santa Fe de Tumpa. La verificación de la hipótesis fue hecha aplicando el t-student.

Palabras clave: Programa aplicativo, aprendizaje, representativa, lúdica, motivadora.

Abstract

The objective of the research is to determine the influence of the Application of the Geogebra Program in the Learning of Geometry in students of 4th grade of High school N° 86620 Santa Fe de Tumpa - Yungay, 2018. The research is cross-sectional experimental type, quantitative method and pre-experimental design. Two instruments were applied: an entrance exam and an exit exam, to a population sample of 22 students from the 4th grade of High school N° 86620 Santa Fe de Tumpa. The results were analyzed after applying the Geogebra program to the single study group. It was found that there is a highly significant influence ($p = 0.00001 < 0.05$) of the Application of the Geogebra program in the Learning of geometry course in High school 4th grade students. The verification of the hypothesis was done by applying the t-student.

Keywords: Covid-19; Application program, learning, representative, playful, motivational.

1. Introduction

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In the Peruvian educational system, the low performance of students is a constant concern of parents, teachers and authorities, a concern that is reflected in the students' dropout rates, logically there are several factors that influence this dropout. In this regard, the National Household Survey (ENAHU), (2016) provides the reasons that dropouts give to support their absence from an educational institution. Thus, in 2016, 43.5% of dropouts in the 13-19 age range assigned their desertion to financial problems, 12.7% to family problems, 12.4% to housework, 23.6% to a lack of desire to study, 1.9% to the absence of an educational center, and 6.0% to others. This distribution does not show greater variations than those observed, for example, in 2011, where the reason that presented the highest percentage was also "economic problems" with 44.9% of the total. (Ministry of education, 2012), ESCALE - Statistics of Educational Quality.

Learning problems are situations in which an EBR student at the secondary level can be found, which can be cognitive, physical or mental, or due to some social problem in which the student is (National Curriculum of Basic Education). If a learning difficulty is detected, it is necessary to make a diagnosis, which allows us to know if the child who appears to have difficulties in any particular area, in our case it is mathematics, he really has them and what they consist of. In the specific case of the area of mathematics, it is important to make the diagnosis, where it can be shown what the situation really is that the student suffers, taking into account the part of geometry and statistics, to determine if there is a disease that may degenerate the learning process as (dyslexia, dysgraphia, dyspraxia, etc.) (Ospina, 2017).

Mathematics teachers have been observing that at the 4th grade of EBR at the secondary level, students from different secondary educational institutions and with different levels of mathematical abilities attend; often deficient. In addition, taking into account that it is the beginning of the new secondary educational level, in which basic concepts dealt with at the primary level begin to be developed again and, without neglecting that this new educational level is also the beginning of the stage of the formal operations, of adolescents, according to Piaget in his Cognitive theory; noting that: at this stage (11 years and older) the adolescent achieves abstraction on concrete observed knowledge that allows him to use inductive and deductive logical reasoning.

Reason why, we consider it necessary and appropriate, to level students, giving them the opportunity to clarify these basic mathematical concepts, in such a way that they are significant for students, through the application of educational software, such as Geogebra, which The Plane Geometry course will allow them to interact and self-learn. The incorporation of Information and Communication Technologies (ICTs) to education offers different dimensions to the instructional process, Salinas (2004). In particular, the use of educational software in the teaching-learning process allows the student to improve cognitive skills. Educational software encourages problem analysis, facilitates group work, provides support for academic activities, in the broadest sense improves thinking skills and problem solving.

One of the Applicative Programs is Geogebra, a free, simple and dynamic program for the teaching and learning of mathematics applied to all educational levels, it is also a tool that provides abstraction processes to show how a relationship is built between a geometric model and an algebraic model of a real life situation, which allows finding not only mathematical but also visual solutions that represent the solution of a certain problem. In 2001 the first version of the Geogebra program came out, its creator and current team leader is Markus Hohenwarter, work he did as part of his master's degree in mathematics education and computer science. He currently works at the Linz Johannes Kepler University in Austria. Geogebra "is interactive math

software that dynamically brings together geometry, algebra, and calculus." (Hohenwarter & Lavieza, 2009), where interactivity is mediated by the use of mathematics by teachers and students, since it was planned to develop teaching activities of any knowledge that involves the use of equations, graphs and data analysis, allowing the graphical, algebraic and spreadsheet visualization dynamically linked. As its name implies, Geogebra is a program that mixes geometry with algebra. In this sense, for the geometric part it can be located within the dynamic programs which, in general, allow geometric constructions, with the advantage of being able to move the construction points and observe their invariants and characteristics.

Currently we live in a scenario of constant changes and transformations caused by Information and Communication Technologies (ICTs), which affect a new way of teaching and learning, different from the one we who are now teachers live. That is why we must seek new ways to motivate, capture interest, and ensure that the students of this digital age learn what is necessary to function in the best way in the globalized world in which we are inserted.

According to Rivero (2007), the current dilemma is not choosing between new technologies and teachers, both have irreplaceable roles; however, the traditional roles of the teacher must be redefined. In the Peruvian context, it is necessary to address demands such as better professional training, workshops for the periodic exchange of ideas among teachers, teaching the use of computers and other electronic media, and the establishment of learning modules in local networks and regions. Likewise, learning to encode and decode messages, as well as learn more about television and computers, will help the teacher to understand that these media break the linear sequence of the traditional curriculum construction.

The teacher who tries to remain in the old role as the only source of oral transmission of knowledge has the losing battle. In addition, from the knowledge acquired in these alternative information sources, the student has other resources and materials with which to discuss the information received. The way we communicate has evolved from traditional media to digital media, with an emphasis on collaborative communities, the essence of web 2.0, creating, sharing and socializing. However, the reality in university classrooms is quite different and technology is dispensed with, due to lack of training or ignorance of ICTs, as these can help us to teach and learn mathematics, through a Geogebra Application Program. On the research work, there are some research works (correlational, quasi-experimental, and others), relatively related to this work, that is, works on the Geogebra Application program and mathematics learning that will necessarily be taken into account in this work. research.

For this we consider some research works:

Torres and Racedo, (2014), in their research work whose name was: Didactic Strategy mediated by Geogebra Software to strengthen the Teaching - Learning of geometry in Students of the 9th grade of High School, they reached the following conclusion: That the The use of the Geogebra program as a didactic strategy not only strengthens the teaching-learning of the area of geometry, but also contributes to the improvement of mathematical logic skills.

Benedicto, (2012) carried out the research entitled: Study of functions with Geogebra. I present a proposal to improve the understanding of some concepts related to functions, thanks to the use of Geogebra. The work narrates the experience carried out with 2nd year high school students of the IES Campanar de Valencia, where a series of activities was carried out with the help of Geogebra that facilitated the visualization of dynamic images and the understanding of the concepts (average variation rate, derivative, monotony, extremes and concavity).

Almost all the professors of High School N° 86620 Santa Fe de Tumpa -Yungay, they do not use Application Programs, even less as in the case of Geogebra; in their teaching-learning process, they are merely expository, they have not dared to make a virtual class to the students, for which

they do not make the classes attractive and even less to be communicative with their teachers. There is an educational justification, due to the use of technological resources in the teaching-learning process that is nothing new, because it would be difficult to imagine the development of any educational activity of Geometry in the students of the 4th grade of High school N° 86620 Santa Fe de Tumpa -Yungay, 2018? without relying on any curricular material and pedagogical means. We could say that without It would not be possible to put an educational program or project into practice, which is why we posed the following problem: How does the Geogebra Application Program influence the learning of geometry in students of the fourth grade of high school?

II. Materials and Methods

Type of research

The present investigation is of a basic type. Experimental, cross-sectional, quantitative method and pre-experimental design, the results were analyzed after applying the Geogebra application program to the single study group.

Research design

Research design can be defined as a schematic structure or organization that the researcher adopts to relate and control the study variables. "It serves as an instrument of direction and restriction for the researcher, in this sense, it becomes a set of guidelines under which an experiment or study will be carried out." (Hernandez, 2010).

To achieve the proposed objectives and to analyze the certainty of the formulated hypothesis, the research design is pre-experimental, whose scheme is:

GE: O1 -----X----- O2

Where:

EG = Experimental group (Unique group)

O1 = Pre-test at the diagnostic level applied to the experimental group

X = Experiment (Geogebra Application Program)

O2 = Post-test applied to the experimental group to find the significant difference

Sample population

The population was made up of all the students of the 4th grade of High School N° 86620 Santa Fe de Tumpa, made up of 22 students.

Data collection techniques

- Survey: The questionnaire consisted of 10 questions, which allowed us to measure the independent variable (Geogebra Program). This instrument was validated by experts before applying it. Likewise, it was to collect information from students and standardize their computer processing for statistical analysis.
- Interview: To collect verbal information through individual questions regarding the research problem
- Pre test: At the beginning, a written test was considered in order to know, analyze and diagnose the previous knowledge that the students bring, about the Geogebra application program.
- Post test: At the end of the experiment, the same written test that was taken at the beginning is taken, in order to evaluate the learning progress of the students to measure the achievement of the objectives set. To perform the data analysis we used descriptive statistics and for hypothesis testing using the student t test

Techniques for information processing

- The analysis of the data and its interpretation obtained in the information, the data were organized through a tabulation matrix in Excel and SPSS 20.
- Interpretation of the influence of one variable on the other.
- Determine the degree of generalization of the research results.
- Comparative tables: Systematize the information and contrast the elements of the influence of the Applied Geogebra program on the learning of the Geometry subject.
- Describe the characteristics of the object of study.

III. Results

In accordance with the objectives set out in this research, the results are shown through the table, which are the reflection of the evaluation carried out by the teacher through the pre-test and post-test, before and after applying the Geogebra Application Program.

Table 1. Influence of the Geogebra application program on learning geometry

Geogebra application program	Learning geometry					
	Low		Medium		High	
	n	%	n	%	n	%
Pre test						
Did not use Geogebra	18	81,8	2	9,1	1	4,5
You used the Geogebra but I don't use the syntax well	0	0,0	0	0,0	1	4,5
You used the Geogebra correctly	0	0	0	0	0	0
Total	18	81,8	2	9,1	2	9,1
Post test						
Did not use Geogebra	2	9,1	0	0,0	0	0,0
You used the Geogebra but I don't use the syntax well	1	4,5	2	9,1	0	0,0
You used the Geogebra correctly	0	0,0	3	13,6	14	63,6
Total	3	13,6	5,0	22,7	14	63,6

Table 1 shows the results of the Pre-test that indicate 81.8% of students in the 4th grade of High School N° 86620 Santa Fe de Tumpa -Yungay does not handle the Geogebra Application Program and they present a low level in Geometry Learning, 9.1% do not handle the Geogebra Application Program but show a medium level in the Learning of the geometry, 4.5% do not use the Geogebra Application Program but have a high level in Geometry Learning, with the same percentage we can indicate that they use the Geogebra Application Program but do not use the syntax well and have a high level in the Learning of geometry.

Likewise, the results of the Post-test indicate 63.6% of students in the 4th grade of High School N° 86620 Santa Fe de Tumpa -Yungay correctly uses the Geogebra Application Program and they present a high level in the Learning of geometry, 13.6% correctly use the Geogebra Application Program and have a medium level in the Learning of the geometry, 9.1% use the

Geogebra Application Program but do not use the syntax well but have a medium level in Geometry Learning, with the same percentage we observe that they do not use the Geogebra Application Program and have a low level in Learning of geometry and with 4.5% they use the Geogebra Application Program but they do not use the syntax well, showing a low level of Geometry Learning; Likewise, it is observed that 9.1% do not use the Geogebra Application Program and have a low level of Geometry Learning.

Table 2. Management of the Geogebra Application Program

Geogebra application program	Experimental group			
	n	%	n	%
	Pre test		Post test	
Did not use Geogebra	21	95,5	2	9,1
You used the Geogebra but I don't use the syntax well	1	4,5	3	13,6
You used the Geogebra correctly	0	0,0	17	77,3
Total	22	100.0	22	100,0

In Table 2, it is shown that the results of the Pre-test indicate 95.5% of students of 4th grade of High School N° 86620 Santa Fe de Tumpa -Yungay do not use the Geogebra Application Program in the Geometry course, while 4.5% use the Geogebra Application Program but do not use the syntax well in the Geometry course. Likewise, the results of the Post test show that 77.3% of the students use the Geogebra Application Program correctly, 13.6% use the Geogebra Application Program, but do not use the syntax well and 9.1% do not use the Geogebra Application Program.

IV. Conclusions

- The research allowed us to determine the influence of the Geogebra Application Program on the learning of Geometry in students of 4th grade of High School N° 86620 Santa Fe de Tumpa" - Yungay, 2018, which significantly influences the learning of geometry in 4th grade High School students.
- According to the hypothesis, it was true, since the research work shows an existence of empirical evidence that the Geogebra application program significantly influences the learning of geometry in High School 4th grade students.

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