

Use of increased reality as a support tool in physics teaching in Baccalaureate

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Abstract---In today's society integrated globally by globalization, the widespread use of digital media and resources, education becomes a fundamental part of this gear to understand technologies of information and communication as its corresponding application. It is a valuable opportunity for teachers to make use of a variety of technological tools to achieve an improvement in the teaching-learning process and promote the development of the individual in their autonomous study. This article analyzes the use of augmented reality to support the teaching-learning process in secondary education, emphasizing the subject of Physics, taking into consideration the variety of media, platforms and technological devices present in most classrooms and homes. , which can be used to facilitate the teaching of the subject under consideration. The objective is to analyze, how to substantiate the importance of augmented reality applied in education as a support in the teaching-learning process, obtaining results through bibliographic and exploratory research in specialized and indexed journals, the respective databases and references verified from the internet, also using the descriptive, inductive-deductive and comparative method which allow us to reach the final conclusions.

Keywords---Augmented reality, teaching-learning, information and communication technologies, technological devices, high school education.

I. Introduction

Today, modern society is advancing by leaps and bounds, while in education we can observe how processes are carried out that have remained intact for decades past. Information and Communication Technologies (ICT), become essential in current teaching and it is important to update pedagogical knowledge in teaching staff, among them we have Augmented Reality (AR), which is a promising technology already present in many classrooms, which helps to improve the teaching-learning process (Prendes, 2015).

Any process of social evolution requires continuous preparation, as well as the adaptation of citizens in the use of new realities, technologies, habits and education is not isolated from this situation, but forms an important part of it, being one of the protagonists in promoting the updating of the global community.

The use of ICT is still debated, it is related to educational innovation with its different tools such as AR, Virtual Reality, as well as Artificial Intelligence.

In the new range of digital tools available we have AR, which offers infinite pedagogical possibilities due to its characteristic of interacting with content, since it allows credible and third-dimensional graphing of the images that are studied and that in traditional contexts do not they stop being a simple photograph, often in low quality, which

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facilitates learning in the student and that acquired knowledge becomes more significant. (López, Gonzáles, Camelo, & Hormechea, 2019)

The RA in Colombia becomes an ally to foster an alliance between reality and digitality, it is booming, in turn it facilitates the teaching-learning process with the use ICT that is closest to the context of each student and generate more viable opportunities because it is more attractive and versatile to students in each of the applied subjects (Angarita, 2018).

The educational community must make use of the new technologies that are being developed and implemented positively throughout the world with an emphasis on Latin America, Ecuador is one of the countries that replicates, adapts and contextualizes the various experiences that have yielded results in the teaching-learning processes in other countries of Latin America and the world.

To achieve the results expected by teachers in their classes, it is required that ICT be included in the curricular grid from the beginning of classes, in addition to being treated very clearly, which favors their correct use to a greater extent. (Diaz, 2017).

The RA is leaving behind its place as a simple tool to become a new educational methodology, placing emphasis above all on the discovery of learning by the student, its use in virtual platforms, in addition to gamification applications, gives a clear image of where the educational process is heading in the current context (Fombona & Pascual, 2017).

Using teachers in a continuous and responsible way with clear objectives provides multiple benefits that students especially appreciate, an education closer to the world context of social development, while globalization takes part in every aspect of the educational community, new strategies, proven methodologies with free access results.

The RA, using it continuously, allows for educational inclusion for students with Special Educational Needs, since it inserts images into a real environment without having to mobilize the student for this purpose, from the comfort of home, knowledge is available. In addition, like all educational tools, efforts must be made to use them correctly to achieve the stated goal, which is to facilitate learning and continue to improve their application to polish and establish an appropriate methodology according to the curricular mesh of each educational level (Ruiz, 2018).

Given the involvement of ICT in education with a wide variety of tools such as AR, teachers must adapt their daily use to their pedagogical tasks, always giving the possibility to reflect responsibly on the implications of using the new technology-based strategies. (López & Perilla, 2019).

When using AR, they feel comfortable using it since it is easy to use, in addition to facilitating autonomous learning and working together with other students, managing to learn the required content in the subjects (Martín-Gutiérrez, 2015).

The benefits and opportunities generated by AR are several and tangible, since they provide the teacher with a more striking strategy in their learning and the teacher with significant support in their educational work, will tend to achieve better results and will strengthen the position that the implementation of new technologies in the educational field (Rodríguez, 2019).

The situation of RA in Nicaragua (Carracedo & Martínez, 2012) is emerging, but with a projection of its use in greater quantity in educational institutions of primary, secondary and higher education, in addition to the company, especially advertising. It is used to a greater extent to complement the practical part of subjects that often do not have

adequate laboratories, so the possibilities of using the tool are multiple, the difficulties presented so far are the possibility of creating your own content and only adjust the already present foreign materials.

In Spain, an investigation was carried out where it was determined that secondary students manage mobile equipment that can be used to carry out activities with RA, with more than 80% of mobiles and tablets using Android as an Operating System, which predisposes to be able to apply in classes the benefits of the tool (Fombona & Vásquez, 2017). Therefore, the application of this technological tool is shown to be viable in classrooms and at home, which is very good in terms of the teaching-learning process.

While in Peru research carried out on elementary school children by four learning meetings established an improvement in the aspect of academic performance, to a greater extent in the Area of Natural Sciences, by combining the theoretical with the practical, optimizing the attention of the students (Alcántara, 2017).

Research in Ecuador indicated that implementing ICT and AR as an important part of a didactic proposition generates better learning for the speakers, achieving a high level in terms of school performance, as well as a current understanding, being more Participatory and strengthening the teaching process (Jara, 2020) shows promise in its widespread use at the educational level to strengthen knowledge.

II. Materials and Methods

This research uses the mixed and exploratory method (Heyvaert, 2013) in which a query is made of various works that rest in various databases, such as Scimago, Eric, Latindex, Scielo, Google Scholar, which treat the educational use of information and communication technologies in the teaching-learning processes with the use of mobile devices and augmented reality, the inductive-deductive method was also used, aimed at the analysis of articles investigated in recent years from verified sources.

We first proceeded with the selection of the topic and the search in the different repositories, using for this purpose those recommended and verified in indexed journals. The bibliographic review of representative investigations of various contexts at the Latin American level, including Spain, Colombia, and Ecuador, was carried out, as well as investigations carried out in Turkey. The topics addressed in the research are conceptualized following a general order that facilitates the reader's understanding.

Augmented Reality provides a decisive space in which the individual being inside observes images or videos superimposed on reality, which provides a better understanding of some content to enrich it, said technology is part of virtual environments, among which reality also stands out. virtual that differs from RA by how much the person once immersed cannot observe external reality (Azuma, 1997).

RA integrates the real with the virtual in a common place. For example, see Figure 1 where you have a moving graph of the solar system on your hand, which when rotated with a cube also rotates the animation, made using the Galactic Explorer app and the Merge cube (Merge Labs, Inc., 2020).



Figure 1. Animation of the Solar System on the hand using RA.

This technology is very promising and has many uses in various fields, but above all in education it facilitates and encourages learning, it provides multimedia means that would not otherwise be possible to use, helps the user to better understand content, makes the classes and above all it is extremely versatile (Fatimah, 2019), being also an economic technology.

In Ecuador, the curriculum of the General Baccalaureate in Sciences (BGU) is structured in such a way that at each level students meet 40 weekly periods of classes per school year, within this distribution we have so-called common core subjects among which we have Physics as an important and transversal part, present throughout the three levels of baccalaureate (Ministry of Education, 2016) The blocks of the subject are articulated with the minimum learning that students have acquired in Natural Sciences during their General Education Basic, so it is necessary to prepare the speakers in a complete interdisciplinary education and that is what Physics aims as a subject.

III. Analysis and Discussion of Results

Based on the analyzed results of different investigations in various countries, it can be inferred that ICTs are gaining prominence day by day and provide greater learning facilities for students, something in which all the reviewed authors agree. Therefore, its application in high school classrooms, with the RA used in support of the Physics subject, is possible and would generate more interest from the speakers.

Education is currently using ICT more often, which has created a better environment for pedagogical practice, motivating students to be more committed to their learning, for this reason Augmented Reality emerges as one of these tools that having been tested for use and verified in their research by (Jara, 2020) in the field of Physics, where it indicates that the student is helped to build and carry out their own learning, making it meaningful due to its contextualized and superimposed graphic part with reality favoring attention.

Similar result was obtained in Spain, where it was determined that students are more attentive and open to learning if the methodology they receive is with the help of ICT, because they are the generation that was born together with them, there must be clear rules for both students as well as for teachers in that the tools provided, such as AR, are a means of teaching, and it is possible that the notion of the real will be lost if it is abused in its use (Martínez-Pérez,

2018), therefore, to achieve a balance in learning the Student needs to be a better observer of reality to contextualize it with what has been learned.

Motivation is essential in educational processes to enhance learning and make it more enjoyable, RA provides and encourages spaces full of interest to students and teachers, interactive teaching is generated, more striking and therefore with greater attention, which translates in better academic performance, in addition to the fact that RA is not only applicable in the pedagogical process, but also in professional performance in other tasks apart from teaching, such as Social Work, as stated (Cabero-Almenara, Vázquez-Cano, & López-Meneses, 2018).

In a study by (Baran, 2020), a comparison was made of two groups, in which it was found that RA was applied with one and the normal methodology with the other to teach electrical circuits, being the group where the tool was applied the best attitude towards learning, managing to better capture the teachings, compared to the control group, which shows once again how valuable the use of AR is in teaching, very similar to the results of (Demitriadou, 2020) which indicates that implementing RA increases attention, provides better opportunities to promote learning more effectively compared to traditional methodology.

In Turkey (Murat, 2017) found that research on AR has grown exponentially, especially in the last four years, with many advantages and challenges ahead in its implementation, the positive that is indicated is the improvement of learning with a Higher academic performance, the cracks between the requirements at the local level and the research carried out have also been identified, which coincides with the vision of (Fracchia, 2015) that states that the future is shown with considerable expectation in terms of ICT and especially tools such as RA and virtual reality that enrich the information received by students with interactive elements, which can improve the teaching materials that are already used, with virtuality resources that promote better understanding of the speakers and ensure quality learning.

Teachers and students have adequate knowledge of ICT, but they are still incipient in terms of AR, many do not know enough about its operation, much less the pedagogical use it can have, so the teachers who used the tool felt full of enthusiasm and observed the potential that it would have in their teaching practice (Sural, 2018) before which they were open to using RA in each of their teaching days, to finalize their results produced in Turkey, research must be carried out in this regard, measuring efficiency in the use of ICT and particularly RA.

Results obtained in Ecuador by (Sánchez Aguiar, 2019) on the elaboration of an RA application to carry out virtual laboratory practices and complement the learning of the Physics subject in third-baccalaureate students, was widely accepted by the speakers. and teachers, as its use is innovative and adjusts to the reality of all the educational actors of the institution that have mobile devices, they are an Android operating system compatible with the tool used, promoting the learning of the subject that is considered within the hard sciences.

IV. Conclusions

Based on the exhaustive review and observing the results obtained by the analyzed authors, we can conclude that:

The use of Augmented Reality in the educational contexts of the country are possible as support for the pedagogical process of teachers, since it provides more facilities in the way of reaching students.

ICT with its various tools used correctly and precisely in the educational field strengthens the attention of students and, therefore, improves the teaching of various subjects. High school physics can make use of Augmented Reality tools taking advantage of the availability of mobile equipment on the part of the students, so it is recommended to implement its use in teaching practice.

There must be training by teachers and students in the use of this tool, but once they have the skills to use it, there is no going back on the possibilities of use and to continue discovering technological tools that improve the teaching-learning process.

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