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MOBILE LEARNING: SUPPORT IN CREATING A DATABASE FOR ELEVENTH GRADE STUDENTS FROM GIMNASIO CAMPESTRE SAN RAFAEL

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Abstract. In the society in which we live, technological advances and the need to be in constant communication with information are inevitable. Applications and mobile devices to support education have become important tools: the content of this document focuses on research on learning supported by ICT tools, specifically, in the databases subject taught to eleventh grade students from Gimnasio Campestre San Rafael. This strategy aimed to design a learning scenario with which it is possible to reinforce topics seen in class and interact with students via the mobile device, make academic inquiries through websites, specific documents and video tutorials and interact with the teacher regardless of the place or access time. The study was carried out using a quantitative approach, based on pre-test and post-test data, with an experimental-type scope; defined by two contexts, an experimental group and a control group. The study is correlational in nature, since it allowed for the analysis of the relationship degree between the dependent variables and the independent variables. It is concluded that the use of apps is of great importance, since it is clear that, with the mobile application, students achieve an improvement in their academic performance and motivates them, which allows to reinforce the contents of the subject and promote communication between students and teachers. It should be noted that this research is relevant to implementing mobile learning to future research.

Keywords: Mobile devices, e-learning, m-learning, Virtual Learning Object.

APRENDIZAJE MÓVIL: APOYO EN LA FORMACION DE BASE DE DATOS PARA ESTUDIANTES DE GRADO ONCE DEL GIMNASIO CAMPESTRE SAN RAFAEL

Resumen. En la sociedad en que vivimos, los avances tecnológicos y la necesidad de estar en constante comunicación con la información son inevitables. Las aplicaciones y dispositivos móviles cómo apoyo a la educación se convierten en una herramienta importante; el contenido de este documento se enfoca a la investigación sobre el aprendizaje apoyado con herramientas TIC específicamente en la asignatura de base de datos a estudiantes de grado once del Gimnasio Campestre San Rafael. Esta estrategia pretendió el diseño de un escenario de aprendizaje con el cual se pueden reforzar temas vistos en la clase e

interactuar con los estudiantes desde el dispositivo móvil, realizar consultas académicas por medio de sitios web, documentos específicos y video tutoriales e interactuar con el docente sin importar el lugar ni el tiempo de acceso. El estudio se realizó mediante un enfoque de tipo cuantitativo, basado en datos pre test y post test, con un alcance tipo experimental; definido en dos contextos un grupo experimental y grupo control, el estudio es de tipo correlacional ya que nos permitió analizar el grado de relación existente entre las variables dependientes y las variables independientes. Se concluye que el uso de las APP es de gran importancia ya que se evidencia que el estudiante consigue una mejoría en su rendimiento académico, genera motivación la cual permite reforzar los contenidos de la asignatura y favorece la comunicación entre estudiantes y docentes. Cabe resaltar que esta investigación es relevante para implementar el aprendizaje móvil en futuras investigaciones.

Palabras clave: Dispositivos móviles, e-learning, m-learning, objeto de aprendizaje virtual.

Introduction

The Gimnasio Campestre San Rafael, located at Tenjo, in Cundinamarca, Colombia, presents one problem that was at the same time the motivation for this study. The subject "IT and Technology" taught in eleventh grade, is only taught for one hour a week, as established in the syllabus, which means it does not count on much class hours due to the fact that other subjects enjoy more class hours, such as Math, Spanish language, English language, Chemistry, Physics, English lab, Natural and Environmental Sciences, Dance, Gymnastics, Theory of Knowledge, Recreational activities.

Consequently, the few class hours dedicated to the IT and Technology subject (50 hours per week) and the fact that sometimes there is no continuity between lessons, leads to difficulties in the adequate acquisition and understanding of knowledge and abilities to develop the databases' contents, in the theoretical and practical branch.

Time interval is limited, sometimes it is not possible to work with the computer, then the student cannot put the knowledge into practice, for example, developing MySQL Workbench[1] databases, thus, the syllabus cannot be completed and so knowledge fails to be constructed, developed and settled.

One of the strategies applied to the subject is the theory training taught at class, which is carried out with the support of an IT tool, which makes it more appealing and interesting for the student, since the results can be seen in the theoretical aspects, however, due to the lack of hours and lack of student-teacher communication and interaction, such aspects do not go beyond class.

At Gimnasio Campestre San Rafael, learning about databases is conceived to be happening under a theory-practice component, particularly related to the study of databases managers (as it is the case for MySQL Workbench), and hence put what has been learned into practice.

To teach the databases subject, the teacher needs to deal with important topics both in theory and practice, but time is limiting the learning planning; subjects as databases foundations, databases types, download and installation of MySQL Workbench, basic databases concepts, internal structure of a database, types of data

[1] MySQL Workbench is a graphic tool thought for design, administration, maintenance, integrating software development, for the MySQL database
https://www.mysql.com/products/workbench

managed with MySQL[2], databases properties, tables, files, constants, variables, expressions, functions, queries, table relationships, data update, forms, reports, primary keys, foreign key among others, lessons are agreed upon the achievements and indicators established in the syllabus, for a strict chart must be met because of the short class hours.

In this way, through a pedagogical strategy that includes the use of mobile technology, to which you can access from any part of the world and at any time, both theory and practice of the lessons taught in class can be strengthened. Considering the recognition of the benefits that researchers have given to cellphone technology in education, it is possible to mention the writing called M-learning and smartphone in the IT and Technology class from Compulsory Secondary Education (Mosquera, 2017), another research project "Mobile devices in Education and their impact on learning" by Camacho (2016), M-learning: learning through mobile technology, from the higher education students . Instituto de Estudios Superiores de Tamaulipas–Red de Universidades Anáhuac, 2015 (Róman, 2015) and "Current trends on the use of mobile devices in education" developed by Cantillo (2012), mobile technologies have restructured the educational panorama, giving education not only mobility, but also connectivity, ubiquity and permanence, that are characteristics of the mobile devices. It is very likely that the student finds new spaces, free time and is more motivated to learn in It and Technology and, concretely, to learn about the download, installation and development of databases. In the report MINTIC (2018) By the end of the fourth trimester of 2017, the total number of accesses to mobile Internet was 15.177.943, a figure composed of third generation 3G accesses (8.856.897), followed by fourth generation 4G accesses (5.212.602) and second generation 2G accesses (1.108.444)", shows the growth in the use of mobile devices, As a matter of fact, together with educational applications, students will benefit because they will be able to access to mobile learning and training both measured by the ICTs.

This is how the next research question appears: how does the use outside class of an app strength learning about databases in the subject IT and Technology offered to eleventh grade students from Gimnasio Campestre San Rafael?

There are multiple learning models on which the educational process is based using diverse approaches. When this research process started, it was found that many focus on technology and on how to include the contents and information in a mobile application, but when analyzing other approaches, it was observed that they are focused on purely pedagogical aspects where what is sought is the way to carry out these interventions, the user-app interaction and the way students are going to interact with the machine, the contents, the tutor, their peers and everything that has do to with the mobile app context in education.

In a mobile learning process aimed at a group of students it is necessary to keep in mind different aspects that must obligatorily condition the relationship between the teacher the student(s) and the mobile app content, these personal spaces will be possible if the students' specific circumstances are taken into account, the spaces in which the learning is produced, the motivation to learn and the way how learning develops with regard to the students' academic performance.

A learning plan must be well structured, following the individual, group, context, social and technical learning, with the aim that the student learns and

[2] MySQL is a database management system that is relational, based on structured queries language (SQL)

understands the subjects, since the information's treatment, time, place, abilities in the handling of resources are present in their teaching-learning process via experience and practice.

From the traditional learning theories, in accordance with Mosquerra (2017) "Mobile learning, or m-learning, has its origin in its predecessor, the e-learning", hence, mobile learning or M-learning, (Otero, 2014) is defined as the use of mobile devices to improve quality and ease the access to resources and services, as well as to achieve the exchange and collaboration among the knowledge society via mobile Internet, mobile devices or laptops starting from two fundamental elements, that are, what is learned and how that is learned. Keeping in mind the previous concept, it is clear that mobile devices or laptops have a great evolution, in software (operating systems and mobile apps) and hardware (dimensions, weight, screen, internal memory, processor, main and secondary webcam, audio, connectivity, sensors, battery, among others). Continuous improvement in these devices as well as in mobile apps increase daily and highlight the characteristics associated with mobile devices such as: portability, defined by the device's size, connectivity, which is made via wireless networks that allow any kind of communication, voice, chat, video conference among others, an ubiquity that can be defined as being able to use information at any place and moment and the adaptability of services and apps necessary for the user's work that the user may need.

Methodology

The study's objective is to analyze the acceptability of the use of app and mobile devices for the databases subject, taught to eleventh grade students of Gimnasio Campestre San Rafael.

Participants

For this research, the population are students from Gimnasio Campestre San Rafael, located at Tenjo, Cundinamarca, Colombia. Currently, the center has 18 eleventh grade students, that are distributed as follows:

Table 1
Number of students and ages

Students			**Age**		
Men	Women	Total	15 years old	16 years old	17 years old
12	6	18	3	14	1

Note: Source: Own source.

Design

Regarding the design, the experimental design was chosen, that, in accordance with Hernández (2014) it is established that the research design is done with the aim of answering the questions raised in the research and of meeting the study's objectives, for this research, the experimental design is used in two contexts: experimental group and

control group. The first are carried out under controlled conditions in which the effect of the internal invalidation sources is suppressed, as well as any other independent variables that are not manipulated or that are of no interest.

Naupas (2014) indicates the experimental design is a plan that is used to guide the researcher through the experiment. To Hernández (2014), experiments are somehow intervention studies, since a researcher generates a situation to try to explain how it affects those who take part in it with regard to those who are not affected.

From the previous literature and carrying out a deeper study, the research was based on two groups; the first was the experimental group, made up by students with a smartphone with Android as operating system, for the study, it could be observed that 72% of students used Android as the operating system, we need to clarify that the app is only developed for Android. Students from the experimental group need to download the app and install it in their cellphones via a QR code, then, they must interact with the app as to get to know it, the subject is, as it has been said before, databases. The second group was the control group, with students with iOS as the operating system in their cellphones, a percentage of students that is equal to 28%, it must be said that this group cannot download the app because the operating system is not compatible with the app.

Instruments

Instruments were used in accordance with the characteristics and approach were observation, survey and questionnaire, relevant information about the real use context of the mobile app in the learning processes was obtained.

As commented by Hernández (2014) "observing does not only mean seeing, it is about paying attention to much details or events, deepening in and a permanent reflection." Observations allowed, in the first place, knowing the learning environment without the app and afterwards with the observation made with the app, as well as the students' interest towards the adequate use of the APP outside class.

Among other characteristics and/or useful aspects for the research, this first instrument called "general survey" aimed at measuring the ICTs acceptance at class with regard to the second instrument for the research. The survey professor García (1993) defined it as a research carried out about a subjects sample that represents a greater collective, using standardized interrogation procedures with the aim of obtaining quantitative measurements of a great variety of objective and subjective population characteristics.

The second instrument's goal, "Mobile devices" was to assess the mobile device that each one of the students use daily, in other words, the operating system, the installed apps and their user interaction.

The third instrument to carry out the research was the questionnaire, which was used with every eleventh grade students, Hernández (2014) defines it as the questionnaire consists of a series of questions linked to one or more variables to be measured. This evaluation instrument was focused on the app's usability, it needs to be said that usability is considered as one of the most remarkable aspects of a software product's quality. This Liker type survey was divided into three aspects (student performance, the App's environment, contents structure and quality and the App's environment).

Lastly, pretest and post-test tests were used, which measured the topics related to the IT and Technology subject and to databases.

Procedure

The way how this research was carried out concerning the data collection was divided into four phases: The first phase consisted of taking as a sample those students with a Smartphone with an Android operating system and students with iOS as an operating system in their cellphones.

Eleventh grade was chosen, a group made up of eighteen students that attend class-room based lessons, once the sample is chosen, we chatted with them, explaining the relevance of using the app for the lesson, we asked them if they were willing to take part in the study as the sample and if they had free time to use the data collection and instruments techniques (observation, survey, questionnaire, pre-test and post.-test).

The second phase was the design of the research instruments to collect the data, the observation, the survey and the questionnaire. It is necessary to clarify that the researcher developed the instruments.

To develop the surveys, the answers were written basing on the objectives and the research question, so the respective formats were developed taking into account the variables to be worked on. The chosen independent variable was "APP's Implementation" which strengths the student's individual and social. That is the learning in the databases which the student decides time and place to learn, in this way, meeting the proposed objectives in the experience of learning about databases. The chosen dependent variable was "the academic performance" which is such a relevant indicator for the research study since it allows to make evident the student's interest in self-learning, studying the lessons, same as the improvement in the learning process.

Students rendered a great deal of information via the collection data instruments for this research. It is important to highlight the importance of the contents taught at class and how learning is in the lessons including ICTs, since this is the only teaching-learning way, initially.

The first questionnaire was general, with questions Likert-type, a process through which the ICT acceptance is measured was carried, with an emphasis on mobile devices in classroom-based lessons.

The second questionnaire was answered via the Google tool called forms, a Likert-like questionnaire. In that form, a bit more specialized answers were included about mobile devices that each student uses daily. The information obtained was reviewed via a careful reading and codification that led to the identification of important points for the research.

During the observation, relevant data such as the app's download, date, used material, topics worked on, the app's use of information in the lesson's development and the conclusions for the research.

Finally, the fourth stage consisted of the analysis and interpretation of the data, for that reason, a usability questionnaire called "Cellphone's trustworthiness and validity" was used (Ryu, 2006). With this study, the goal was to determine the psychometric quality of the usability's questionnaire, via this process, the results obtained were studied as to write the study's conclusions. The data collection process (observation and interviews), data analysis results and conclusions of the research that was carried on for months.

In accordance with the classroom-based lesson about databases in the IT and Technology subject, a pre-test and post-test quantitative scale measurement were

carried. This scale has a range from 0 to 5 to grade the test assigned to the academic performance, with 1 being the lowest grade and 5 the highest.

Through a diagnostic test (pre-test and post-test) the students' pre-concepts were studied, about the foundations in databases. This test was used with both the experimental and the control group. It is necessary to clarify that the test was used after teaching foundations in databases in a master class. Afterwards, the app is uploaded to a web page, where the control group according to the research conditions does not receive the mobile app, while the experimental group does. Subsequently, a second evaluation takes place, where from the results and statistical analysis such as the average is developed with the support of IBM SPSS software. The IBM SPSS program is a computer statistics program developed by IBM that is widely used in social and applied sciences, and so it is by market research companies all around the world. Software is used and associated with work and efficacy in the use of technological tools and their relevance to strength and ease the topic's learning process, additionally, this phase compiles, analyzes and links the quantitative data to describe how the training processes designed with the ICT implementation do favor or not the IT and Technology class in Gimnasio Campestre San Rafael.

The pre-test and post-test are multiple choice; students choose one answer. These kind of tests belong to the structured and written type tests, these are answers with multiple options from which one is correct and the rest are distracting, or all the answers are partially correct. These tests are used to measure simple learning outcomes: (knowledge) or complex learning outcomes:(understanding, use, interpretation...) the test is made up of 10 questions and the grading scale id 1 to 7.

Results

Below are the results of the grades obtained for every test for the control and experimental group, as well as their average score:

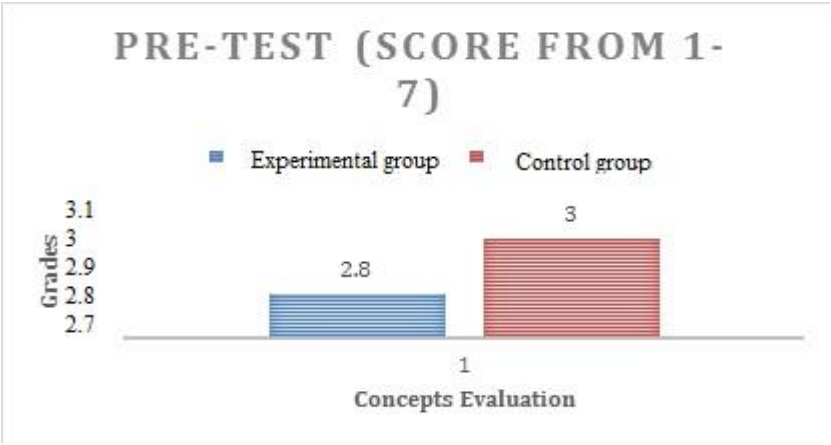

Figure 1. Pre-test comparative, average score

As it can be observed in Figure 1 "Pre-test comparative, average score" the pre-test average score for both the control and the experimental group is similar, so it can be

stated that they both have the same concepts on databases, with an average of 2.8 in the experimental group in contrast with the 3 average score out of 7 as a maximum score.

After class and having used the app in the experimental group, every student rendered the post-test individually, same as the control group, that did not used the didactic strategy. It was clear that there was a general improvement in the grades for the experimental group, in comparison with the average obtained in the pre-test. Results are shown in the figure below.

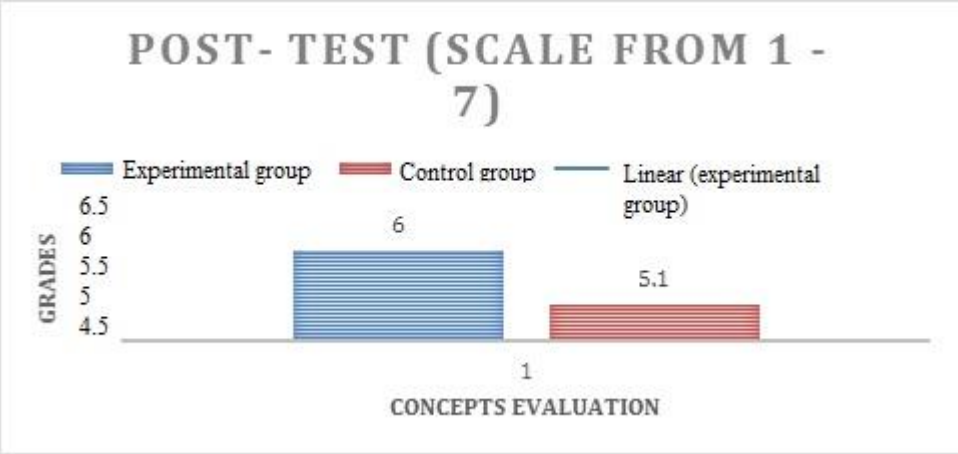

Figure 2. Post-test comparative, average score

Figure 2 shows that the experimental group with an average of 6 had a significant improvement in the grades in comparison to the control group, with an average of 5.1. Likewise, it was observed that each one of the test components (concepts evaluation (pre-test, post-test)), the experimental group obtained a better average after having implemented the mobile app in contrast with the control group, that only learned the classroom concepts, the experimental group, regarding the concepts evaluation component, changed from 2.8 in the pre-test to 6 in the post-test and the control group changed from 3 in the pre-tst to 5.1 in the post-test.

Experimental group pre-test and post-test comparative

The second analysis is a comparative of the results in the pre-test and post-test in the experimental group, with the objective of determining if the experimental group's results improved post-test, since this will allow to establish if the didactic strategy did improve the cognitive competences in databases in students who used that strategy.

The following table of descriptive statistics shows a comparative of the pre-test and post-test averages in the experimental group.

Table 2
Experimental pre/post-test descriptive statistics

	N	**Minimum**	**Maximum**	**Average**	**Standard Deviation**
Pre-experimental	12	5.0	7.0	6.000	.8528
Post-experimental	12	5.00	7.00	6.0000	.85280

Valid N (according to student list)	12

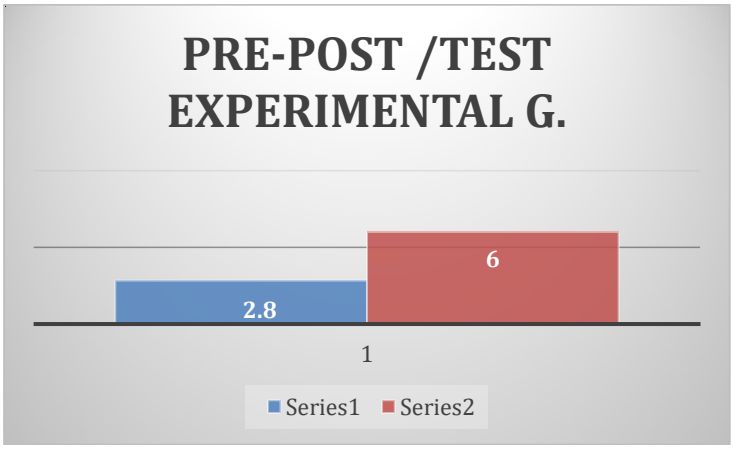

Figure 3. Experimental Group PRE-POST/TEST

Figure 3 (PRE-POST/TEST) shows evidence that the standard deviation measures the data group variations with regard to the average. Basing on that, according to the previous table, it was found that the results of this analysis proved that the average score in the pre-test is 2.8+/- 0.85 and 6 +/- 0.85 in the post-test. Having concluded that standard deviations of the samples are reasonably similar, it is not inappropriate to say that the population's standard deviations are equal.

Figure 3 (PRE-POST/TEST) shows the experimental group's grade average in the pre-test and post-test. It clear that post-test average grades improved if compared to the pre-test average grades.

To corroborate the previous statement, the following hypotheses are stated

Hypothesis definition:

Null hypothesis:

Ho=The experimental group the scores average in the pre-test and post-test are significantly equal.

Alternative hypothesis:

H1=The experimental group the scores average in the pre-test and post-test are not significantly equal

Normality Test

Ho=The "grade" variable has a normal distribution

H1=The "grade" variable does not have a normal distribution

The Kolmogorov or Shapiro-WilK normality test indicate whether a null hypothesis must be rejected. For this case the normality with the Shapiro-Wilk test will be contrasted according to the sample, that is less than 50 data.

The significance level is established to decide to what extent we consider the values are too high to doubt that they do not belong to the population in the null

hypothesis. The significance level established for this research is 0.05, that is to say, <0.05.

Table 3
Normality Test

	Kolmogorov-Smirnov[a]			**Shapiro-Wilk**		
	Statistics	**Gl**	**Sig.**	**Statistics**	**gl**	**Sig.**
Pre-Experimental	.213	12	.139	.811	12	.012
Post-Experimental	.213	12	.139	.811	12	.012

The previous table (Table 3, normality test) shows a significance figure in the Shapiro-Wilk test that is equal to 0.12 in the results obtained for the experimental test in the pre-test and for the same group in the post-test, the result is equal to 0.12. Since the significance level established is 0.05, that is to say, <0.05. The results of the experimental group's pre-test variable presents a higher value than 0.05 compared to the significance level, hence, the null hypothesis is accepted, in other words, the grades variables present a normal distribution, in other words, a skewed distribution.

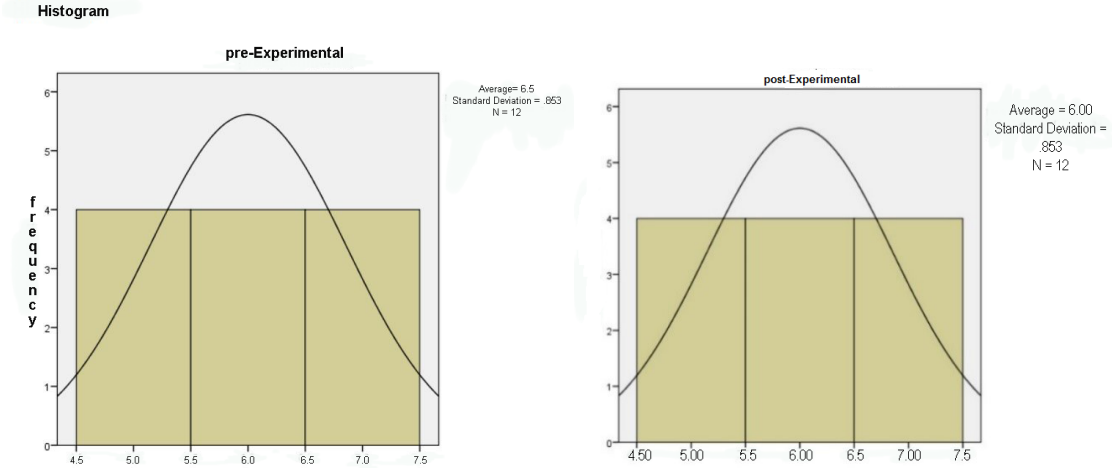

Figure 4. Pre-Experimental and Post-Experimental Histogram

Every time one of the previous test did not present a normal distribution, a non-parametric test was carried out for two independent samples called Mann-Whitney U test with a significance level that is 5%, in other words, <0.05 which allowed to contrast the data from the independent groups.

Pre-test and post-test control group comparative

In the third analysis, a comparative of the pre-test and post-test results for the control group is presented, with the aim of determining if the control group results improved in the post-test in a traditional class, since this will allow to establish comparatives with the experimental group.

The following table of descriptive statistics shows a comparative of the pre-test and post-test averages in the control group.

Table 4
Control group pre/post comparative

	preControl	**postControl**
N	6	6
Minimum	2.0	4.00
Maximum	4.0	6.00
Average	3.000	5.1667
Standard Deviation	.8944	.75277
Variance	.800	.567

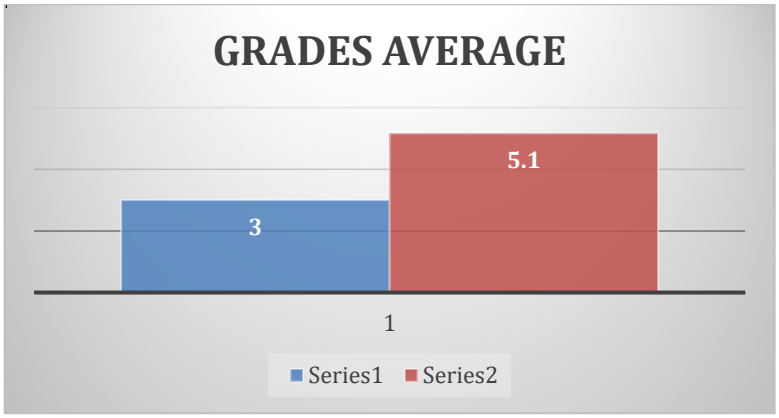

Figure 5. Pre-test and post-test control group comparative.

Figure 3 (PRE-POST/TEST) shows evidence that the standard deviation measures the data group variations with regard to the average. Basing on that, according to the previous table, it was found that the results of this analysis proved that the average score in the pre-test is 3+/- 0.89 and 5.1 +/- 0.75 in the post-test.

Having concluded that standard deviations of the samples are reasonably similar, it is not inappropriate to say that the population's standard deviations are equal.

Figure 5 (PRE-POST/TEST) shows the experimental group's grade average in the pre-test and post-test, which make it clear that post-test average grades improved if compared to the pre-test average grades.

To corroborate the previous statement, the following hypotheses are stated

Hypothesis definition:

Null hypothesis:

H0=The control group the scores average in the pre-test and post-test are not significantly equal

Alternative hypothesis:

H1=The control group the scores average in the pre-test and post-test are not significantly equal.

Normality Test:

H0=The “grade” variable has a normal distribution

H1=The “grade” variable does not have a normal distribution

The Kolmogorov or Shapiro-WilK normality test indicate whether a null hypothesis must be rejected, for this case the normality with the Shapiro-Wilk test will be contrasted according to the sample, that is less than 50 data.

In accordance with what has been stated before, it can be observed that the experimental group with 6 as an approximate average improved the grades in the post-test, in comparison to the control group, that obtained a non-passing average grade of 5.1. Similarly, it was clear that in every test component (pre- and post-test concepts evaluation), the experimental group obtained better average figures, every time the score was higher than 2.8 in pre-test, such figure changed to 6 in the post-test, making it clear that there was a better understanding of the concepts regarding databases. Concerning the concepts’ use, the number varied from 3 in the pre-test to 5.1 in the post-test, with an average passing grade higher than 5.0. At this point, it was notorious that the technology tools via ICT (mobile app) developed with the implemented didactic strategy in the experimental group allowed eleventh grade students to learn some abilities.

As stated by the results obtained with the use of tools, the forms handed in to the eleventh grade students from Gimnasio Campestre San Rafael, it is concluded that:

Smartphones are the most popular devices among eleventh grade students from Gimnasio Campestre San Rafael, in comparison to phablets or tablets; the research study proves that it is key to prioritize the use of mobile devices as a tool for supporting the teaching-learning process, since this is a device the students uses during the major part of the day.

In this educational process, a mobile app is used, one that supports and promotes learning at any place and moment, in other words, ubiquitous learning via ubiquitous technology.

Besides that, the development of mobile apps for educational purposes are resources to support the students’ learning, it is clear that it provides mobile educational technological solutions with the characteristic that the content (additional readings in pdf and doc formats, (documents developed in Word), video tutorials relates to the topic, links to trustworthy web pages searched by the teacher), can be accessible from any place and at any time.

As well, the use of instruments proved that the most widely used operating system is Android, considering that is an operating system that was thought to be used in cellphones, which provides all the interfaces needed to develop apps that access to the smartphone’ functions (such as GPS, webcam, keyboard, sensors, calls, agenda, among others) in a very simple way in a very well-known programming language as Java is; it is also a flexible operating system, friendly, that allows to install and manage the mobile app provided by the teacher, so the student can enjoy the app at any moment and with no restrictions.

Eleventh grade students from Gimnasio Campestre San Rafael use and connect their cellphones to the Internet using a data plan paid by the parents, by themselves or they rather connect to the school’s WIFI, which is freely accessible.

The most widely used apps are: social media (Facebook, twitter, waze, WhatsApp, Instagram, YouTube, Snapchat, Musically, Spotify, among others**)**, same as

screens to change the smartphone's look, downloaded music and other apps of personal interest: Memrise, Duolingo, Learn English, Sounds: Pronunciation, whose objective is to learn or improve the current English level, taking into account that Gimnasio Campestre San Rafael offer bilingual education. In addition to that, students rely on some background on previous apps installation.

All of this aims at the desire to support the teaching-learning process and the technology and IT classes of Gimnasio Campestre San Rafael with the databases topics with the MySQL Workbench tool.

Discussion and conclusions

Thanks to the mobile app, students can experiment the knowledge from a non-traditional perspective using it, it is clear that as time goes by they are willing to understand and deep in the knowledge with new information resources via the mobile app. Additionally, the difficulties to the study and recommendations will be presented so that posterior related works can bring increasingly integral answers.

This study's is included in the Design and development of digital educational resources line of research, which focuses on the design and development of educational resources to take advantage of them in digital scenarios.

Particularly, a mobile app was designed, developed, implemented and evaluated with a clear focus on education and it was done with a theoretical and technological support for the academic performance's improvement of students.

This research study's goal is to motivate teachers and researchers to put into practice and implement mobile apps whose purpose is to strengthen students' learning.

One of this study's goals was for the students to improve their academic performance and to do so via the mobile app, the teacher's support, and the support among peers, for such factors allow to build knowledge.

Aretio (2017) establishes that "The illusion of being able to be permanently connected, no matter time or space, is no longer an entelechy. Communication with everyone and permanently, as well as the incomprehensible information world that is kept on the Internet", hence, it is confirmed that mobile learning is a possibility for the student to have access to supporting elements that ease the training via an app that is installed in the smartphone. Consequently, this states that the didactic strategy allowed the student to better understand and use the concepts, making the student responsible for the learning process and broadening the student's vision on these kind of instruments to learn about databases.

In the research study, it mainly stands out the student's role in the app's development and use, there was a positive commitment, responsibility, interest and support to continue with the learning process, as well as there was a greater collaboration and distribution of information and knowledge with the individual learning, moreover, the teacher enhanced collaboration, creativity, criticism and self-criticism and reading.

Concerning the mobile learning model, it can be said that the evaluation results were satisfactory, it was possible to make students get involved in a learning model that was unknown until that moment for them, as well, the use of the mobile app beyond its

traditional use was achieved; furthermore, students took charge of the mobile learning model.

Concerning didactics and pedagogy, an integral training was achieved for all students, since they learned the theoretical and practical knowledge, values such as responsibility and respect stand out, the use of ICT tools was boosted and hence, their work was eased, and so it was their results, Aguila (2017) says that m-learning is a learning modality or learning environment that happens via devices that allow people or content to move.

The difficulties faced initially were making that all students paid attention while reading the pdf files, nevertheless, they watched the videos and URL with specific information on the subject, however, students claimed the need to have more feedback at class when they did not understand something related to the use while working.

Some of the recommendations identified for future projects is to develop the app for other operating systems such as iOS, because it is statistically speaking the second most used operating system after Android. The other recommendation is to develop and implement the mobile learning app to diverse educational experiences to expand the learning area, in other words, to use it in other subjects or areas of knowledge and to validate its results, in this way, teachers that develop and implement it can share the educational experiences and allow the exchange of knowledge.

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