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Mobile-assisted language learning using Gamification and Virtual Reality techniques during the COVID-19 pandemic

El aprendizaje de idioma asistido por dispositivos móviles mediante técnicas de Gamificación y Realidad virtual durante la pandemia del COVID-19

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Abstract

During the global pandemic in Guayaquil, Ecuador, and the accelerated transition to online education, teachers questioned the integration of educational technology in the training of technology scholars and its impact on the learning process. The main objectives of this study were to understand the contextual perception of the scholars on the use of technologies such as Mobile Device Assisted Language Learning, Gamification and Virtual Reality in teaching English to higher technology students during the COVID-19 pandemic in Guayaquil. In addition, we sought to identify which of these technologies teachers preferred to use to teach English. This study followed a quantitative approach and used an adapted online questionnaire. The results of the reliability test showed high consistency with a value of 0.866 according to Cronbach's Alpha statistic.

Keywords: mobile apps, medication, elderly, biomedical technology

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Resumen

En medio de la pandemia mundial en Guayaquil, Ecuador, y la transición acelerada hacia la educación en línea, los profesores se cuestionaron sobre la integración de la tecnología educativa en la formación de becarios de tecnología y su impacto en el proceso de aprendizaje. Los objetivos principales de este estudio eran comprender la percepción contextual de los becarios sobre el uso de tecnologías como el Aprendizaje de Idiomas Asistido por Dispositivos Móviles, la Gamificación y la Realidad Virtual en la enseñanza del inglés a estudiantes de tecnología superior durante la pandemia de COVID-19 en Guayaquil. Además, se buscaba identificar cuál de estas tecnologías preferían los profesores para enseñar inglés. Este estudio siguió un enfoque cuantitativo y utilizó un cuestionario en línea adaptado. Los resultados de la prueba de fiabilidad mostraron una alta consistencia con un valor de 0.866 según la estadística Alfa de Cronbach.

Palabras clave: Aplicaciones móviles, medicación, ancianos, tecnología biomédica

Introduction

Coronavirus, also known as Covid-19, has been identified as a deadly infectious disease caused by severe acute respiratory syndrome, as well as some types of the common cold. Due to its rapid spread and the numerous deaths it has caused, a worldwide pandemic emergency has been declared. As a result of this outbreak, the first Movement Control Order (MCO) was issued, which involved an Ecuadorian-wide containment.

This has had an impact on the education sector, as throughout the pandemic crisis, schools had to close temporarily. As a result, the Ecuadorian Ministry of Education opted for online education or e-

learning through technology or devices to facilitate communication instead of face-to-face classroom learning.

In 1981, the Ministry of Education of Ecuador offered a course called Instructional Systems Technology for the in-service teacher training program in order to improve the educational system by focusing on the teaching and learning process. Since then, many researchers have conducted studies on the implementation of 21st century technologies such as Virtual Reality, Gamification and Mobile Assisted Language Learning (MALL) applications to develop and improve students' English language learning.

In addition, online games have influenced the lifestyles of children, teenagers and even adults around the world. Researchers believe that the application of gamification in education would not only motivate students, but also increase their focus on learning and their higher-level thinking skills.

According to many researchers regarding the use of mobile applications in language learning, this approach could also be defined as constructive learning. For example, study results show that the use of Mobile Assisted Language Learning (MALL) in the classroom benefits students by motivating their attitude towards learning and enhancing their learning experience.

The concept of Virtual Reality dates back to the mid-1960s, allowing the user to perceive the virtual world as if it were real and to act realistically in it. Hundreds of researchers have explored the effects and applications of this technology over the past 20 years. According to Singhal, Bagga, Goyal, and Saxena (2012), Virtual Reality technology has attracted public attention because it allows users to interact with real and virtual objects, providing experiential learning and increasing user attention and motivation at the same time.

There is evidence showing that Virtual Reality application has been adapted in various educational sectors, such as early childhood education and elementary schools, to teach English language in other countries. It was shown that exposure to Virtual Reality applications helped to improve students' motivation and their more positive attitudes towards English language learning.

However, when teaching with technology, there are advantages and disadvantages. Although it improves students' motivation to learn, teachers must also consider that students may be distracted by the content and not grasp the main ideas of the context. In addition, despite the advancement of technology, there are still students who do not own high-tech devices.

Virtual Reality could be considered a unique method for teaching English to students, but it could also pose problems. For example, it could be expensive for some students who cannot afford it. In addition, understanding the technology, such as digital innovations, could be a problem for both teachers and students. Lack of learning content was the main argument among teachers, as Virtual Reality was designed mainly for entertainment purposes. It is considered a challenge for teachers to acquire technical skills when incorporating this into pedagogical planning. Therefore, cognitive overload when using Virtual Reality applications can be considered a challenge for an effective learning environment.

According to Becta (2004), the inaccessibility of ICT resources was due not only to the unavailability of hardware and software or other ICT materials, but also to several factors, such as poor organization of resources, poor quality hardware, or inadequate software. Teachers also need to provide multiple instructions for many different devices, as each student may possess different types of ICT resources.

Methodology

A proposed sample was used for this study and the target population consisted of a total of 63 participants. The distribution of this questionnaire was done through social networking platforms. Participants were provided with a set of questionnaires through an online Google Forms link and all responses were collected anonymously.

The questionnaire was designed based on a five-point Likert scale ranging from 1 - Strongly Disagree, 2 - Disagree, 3 - Neutral, 4 - Agree

and 5 - Strongly Agree. In total, the questionnaire consisted of 5 sections with a total of 21 questions. The first section of the questionnaire included personal information of the participants, such as age, gender and knowledge of the three technologies. The second, third, and fourth sections were based on the grantees' perceptions of each of the technologies that would be used to teach English language during the COVID-19 pandemic outbreak. While the last section focused on their preference on which of these technologies (Mobile Device Assisted Language Learning, Gamification, and Virtual Reality) they would choose to teach high school students.

The questionnaire was pilot tested with the first 20 responses from a total of 63 grantees. The pilot test data were analyzed using SPSS to assess the validity and reliability of each item. Each item was calculated using Cronbach's Alpha coefficient in SPSS 23. For the items tested, a value of 0.866 was obtained, as shown in Table 1, leading to the conclusion that 86% internal consistency was obtained overall for the 19 items.

Table 1. *Reliability Statistics*

Alfa de Cronbach	Alfa de Cronbach basada en ítems	N de ítems
0,866	0,862	19

Source: Authors' own elaboration

The results indicated that the pilot test value exceeded 70%. Therefore, it was considered absolutely justified that the items had a high reliability for further collection and analysis. Consequently, the data were considered reliable for analysis.

Results

These findings cover the survey participants' responses to each question and their justifications at the end. The question on gender was not asked or included in the first part of the questionnaire because there were more female than male participants. Therefore, no gender-related questions were included in the questionnaire.

This section also shows the descriptive statistics of the frequency of each item presented categorically. The first part presents the quantitative analysis of the data that will answer the first research question, (i) What is the perception of the scholars of technology careers about the strategies of Mobile Device Assisted Language Learning, Gamification and Virtual Reality, for English learners, during the COVID-19 pandemic in three University Higher Technological Institutes of the city of Guayaquil, Ecuador?

The second part presents the percentages that answer the second research question Which ICTs (Mobile Assisted Language Learning, Gamification and Virtual Reality) are the most preferred by scholars to improve English language learning in students in technology careers?

Table 2. *Age groups*

Edad	Total
22	39
23	21
25	2
28	1
Total:	**63**

Note: Table 2 presents the total division of participants according to their age groups. The table shows that most of the participants were 22 years of age.

Table 3. *Teachers' knowledge and experience regarding the three Information and Communication Technology (ICT) Tools.*

¿Alguna vez has utilizado la gamificación en el aprendizaje de idiomas?	Frecuencias
SI	45
NO	18
¿Alguna vez has empleado un Aprendizaje de Idiomas Asistido por Dispositivos Móviles (MALL) en el aprendizaje de inglés?	Frecuencias
SI	42
NO	21
¿Has escuchado o leído sobre la Realidad Virtual?	Frecuencias
SI	55
NO	8

Note: Table 3 shows the statistical frequencies associated with participants' responses to each question. With a total of 63 responses collected overall, the majority of respondents had experience using both technologies (Gamification and Mobile Device Assisted Language Learning) for language learning during the pandemic outbreak in Ecuador, and acknowledged the existence of Virtual Reality (VR).

Research Question 1: What is the perception of the scholarship holders of the University Higher Technological Institutes on the application of the Technologies that support Language Learning Assisted by Mobile Devices, Gamification and Virtual Reality) in the learning of the English language during the COVID-19 pandemic in Guayaquil, Ecuador?

In the second part of this questionnaire, respondents were asked to answer each question using a 5-point Likert scale, where 1 equals "Strongly Disagree", 2 equals "Disagree", 3 equals "Neutral", 4 equals "Agree" and 5 equals "Strongly Agree".

Table 4. *Total Frequencies per Question*

Preguntas	SD	D	N	A	SA
Los juegos son entretenidos y a la vez educativos.	x	x	6	32	25
Los juegos deberían desempeñar un papel especial en el plan de estudios de aprendizaje de idiomas extranjeros.	x	1	1	27	34
Un enfoque de aprendizaje basado en juegos es fundamental para capacitar a los futuros profesores.	x	x	2	33	28
Los juegos son adaptables a diferentes niveles de conocimiento	x	x	1	34	28
Los juegos pueden ser útiles para estimular la adquisición del lenguaje en los estudiantes.	x	x	x	21	42
Dispositivos Móviles (MALL) incrementa la motivación de los estudiantes para el aprendizaje del idioma.	x	x	x	21	42
oportunidades para utilizar el idioma inglés sin limitaciones de tiempo y espacio.	x	2	2	16	43
Los sistemas de Aprendizaje de Idiomas Asistido por Dispositivos Móviles (MALL) podrían mejorar la calidad de las lecciones.	x	3	4	15	41
Las tecnologías de aprendizaje móvil (M-learning) pueden utilizarse como complemento para el aprendizaje de idiomas en todos los niveles de educación.	x	x	3	13	47
Las aplicaciones de Aprendizaje de Idiomas Asistido por Dispositivos Móviles (MALL) pueden crear tareas comunicativas del mundo real para los estudiantes de idiomas.	x	x	2	18	43
La Realidad Virtual (VR) aportaría diversión al proceso de enseñanza.	x	1	1	25	36
La Realidad Virtual (VR) es atractiva y motivaría a los estudiantes.	x	x	1	22	40
La Realidad Virtual (VR) ofrece una forma divertida y desafiante de involucrar a los estudiantes en el aprendizaje de idiomas.	x	x	x	33	30
La Realidad Virtual (VR) debería ser considerada como uno de los recursos didácticos para la práctica del idioma.	x	x	x	43	20
La Realidad Virtual (VR) puede ser considerada como un enfoque realista para el aprendizaje de idiomas.	x	x	x	40	23

Note: Table 4 showed significant agreement. With a total of 63 respondents, most of the participants showed a positive attitude towards the application of these three information and communication technologies (ICT) (Gamification, Mobile Assisted Language Learning and Virtual Reality) to teach the target language to students through a virtual classroom in Higher Technological University Institutes in Guayaquil, Ecuador.

Research Question 2: Which of the Information and Communication Technologies (ICT) (Mobile Assisted Language Learning, Gamification and Virtual Reality) would be the most preferred by scholarship students of technology careers in Guayaquil, Ecuador; to improve English language learning?

This section presents the results in terms of statistical frequency and percentage for the second closed research question.

The results suggested that the scholars believed in the importance of gamification to be adapted in the English language learning process among the scholars' students in technology majors during the COVID-

19 pandemic in Guayaquil, as it could create a fun and enjoyable environment for students to learn. "The fact that young students prefer to use computer games to acquire new information should be expected." - Prensky (2001)

Therefore, the ditectives of these institutes agreed that future teachers should be trained in game-based learning methodology in advance to prepare for the virtual classroom and to be able to interact with students.

In addition, they rated all items positively, as they understood that Mobile Assisted Language Learning (MALL) had a high potential to contribute to effective second language acquisition for high school students. As a recent development in mobile technology, "It was becoming a practical trend in technology-enhanced language learning, where teacher and student can learn and teach digitally anywhere and anytime." - Şad & Göktaş (2013)

Language learning is beneficial if managed systematically through mobile applications when teaching the language.

"Virtual Reality can not only change the way students learn, but also expose them to a simulated version of reality that can be manipulated to meet students' learning needs." - Yahaya (2007)

The data suggest that teachers viewed Virtual Reality (VR) technology as a fun and challenging way to engage students in the language learning process through a virtual classroom. As enjoyable and productive as it is, it could also present a more life-like learning environment for students. In this way, it fosters a sense of participation among students.

Comparison of findings with previous studies

A number of recent studies have indicated that the use of gamification in second language learning has brought significant benefits not only in terms of improving learners' language learning process, but also in terms of motivation.

"Gamification can give more exposure to learning to students during as it adds fun to educational learning" (S1).

The findings of this study are consistent with one of the related literature reviews, Nataliia V. Iaremenko (2017), which stated that:

"The application of gaming elements in education makes it more relaxed, fun and comfortable for students to learn."

This can be accepted to meet the needs of the new generation, where the key to a successful integration of technology in language teaching would be the efficient use of digital tools to enhance student engagement in a task-appropriate manner.

An additional novel finding was that mobile learning applications have been increasingly used by teachers to interact with students in language learning since the beginning of the Technology career curriculum. Several pieces of evidence have suggested that Mobile Assisted Language Learning (MALL) provides students with potential benefits in second language learning, creating a more effective learning-teaching process through the virtual classroom environment. In line with a previous study by Ornprapat Suwantarathip and Wiwat Orawiwatnakul (2015), cell phones can create an enjoyable learning environment and have a positive effect on learning.

"Students do better in a positive learning environment during this pandemic outbreak period when they can connect virtually with their peers. Mobile learning can help improve social integration among students with different learning needs and styles" (S2).

The results of Virtual Reality (VR) in the data findings agreed with previous studies by researchers that the application of virtual reality in language learning had immense potential through immersive and exploratory learning for learners. In addition to helping learners grasp the main idea of the learning topics, it also enabled them to process new knowledge.

"VR visualizations can be experienced in any language" (S3).

For his part, Liang-Yi Chung (2012) stated that:

"The unique virtual environment of this application provides real active learning and interaction that allows students to actively participate in the virtual world."

Conclusions

The real purpose of this study was to determine which of the Information and Communication Technologies (ICT) (Mobile Assisted Language Learning, Gamification and Virtual Reality) would be the most preferred by teachers to teach and improve a target language to students of technological careers in Guayaquil, Ecuador. Given the consequences of the pandemic, this greatly affected educational systems, especially teachers. Disadvantaged students would face difficulties in accessing educational resources outside of schools (UNESCO, 2020). This led teachers to adapt their daily work by planning and conducting lessons virtually.

Yet, learning from the comfort of their homes provides students with a sense of purpose during the COVID-19 pandemic outbreak. It creates a positive environment, experience, and opportunity to establish the target language. Therefore, teachers will need support and training to integrate technology into English language instruction for technology career students. With the successful integration of these ICT tools, students will have the opportunity and opportunity to effectively and meaningfully improve their language.

In addition, this work provides new ideas and a better understanding of how these ICT (Mobile Assisted Language Learning, Gamification and Virtual Reality) should be used to improve students' language learning skills, especially in developing their creativity and increasing their engagement in the study of the target language. In summary, the results showed positive attitudes of teachers in increasing students' motivation to effectively learn English language during the COVID-19 pandemic in Guayaquil.

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