

ICT in the Learning of Phonology in University Students of a Public University in Lima

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Received September 06, 2021; Accepted December 07, 2021

ISSN: 1735-188X

DOI: 10.14704/WEB/V19I1/WEB19130

Abstract

The subject of Phonology has always presented a complex learning curve. Most teachers consider it very difficult to teach the production of sounds, as well as their description to discriminate them. This, which is essential for the learning of phonology, does not receive the importance due to the cloister when this course is taught. The purpose of this research has been to demonstrate how the use of ICT positively influences the learning of phonology. The observed reality was interpreted from the positivist paradigm, using the hypothetical deductive method, with a quantitative approach, of an applied type, with an experimental design. Four treatments were applied which were evaluated with each pretest and posttest to 20 student-collaborators. These instruments were validated by seven experts. The normality test has been

processed with Shapiro-Wilk (0.011). Intentional non-probabilistic sampling was used; Non-parametric statistics were used with the Wilcoxon signed rank tests, the Kruskal-Wallis test and the Bonferroni post hoc comparison tests with SPSS 26. It was shown that there are significant differences in the results of each treatment in terms of regarding the use of ICT in the learning of Phonology. The score obtained in treatment 4 was significantly better than treatment 1. Finally, there was a significant improvement between the pretest of treatment 1 (8.35) and the posttest of treatment 4 (18.40) with respect to the outstanding achievement level. on a vigesimal basis. Non-parametric statistics were used with the Wilcoxon signed rank tests, the Kruskal-Wallis test and the Bonferroni post hoc comparison tests with SPSS 26. It was shown that there are significant differences in the results of each treatment in terms of regarding the use of ICT in the learning of Phonology. The score obtained in treatment 4 was significantly better than treatment 1. Finally, there was a significant improvement between the pretest of treatment 1 (8.35) and the posttest of treatment 4 (18.40) with respect to the outstanding achievement level. on a vigesimal basis. Non-parametric statistics were used with the Wilcoxon signed rank tests, the Kruskal-Wallis test and the Bonferroni post hoc comparison tests with SPSS 26. It was shown that there are significant differences in the results of each treatment in terms of regarding the use of ICT in the learning of Phonology. The score obtained in treatment 4 was significantly better than treatment 1. Finally, there was a significant improvement between the pretest of treatment 1 (8.35) and the posttest of treatment 4 (18.40) with respect to the outstanding achievement level. on a vigesimal basis. It was shown that there are significant differences in the results of each treatment regarding the use of ICT in the learning of Phonology. The score obtained in treatment 4 was significantly better than treatment 1. Finally, there was a significant improvement between the pretest of treatment 1 (8.35) and the posttest of treatment 4 (18.40) with respect to the outstanding achievement level. on a vigesimal basis. It was shown that there are significant differences in the results of each treatment regarding the use of ICT in the learning of Phonology. The score obtained in treatment 4 was significantly better than treatment 1. Finally, there was a significant improvement between the pretest of treatment 1 (8.35) and the posttest of treatment 4 (18.40) with respect to the outstanding achievement level. on a vigesimal basis.

Keywords

Learning, ICT, Phonology.

Introduction

Student and academic life has been affected by the health situation that the world is going through due to covid-19, which has forced social isolation in the months of March to July 2020, by presidential mandate and, therefore, to the stoppage of all productive activities that are not essential in physical contact; among them, face-to-face educational activity

(Woolston, 2020; NSTA, 2020). Thus, this sector is required to work in a sophisticated way with Information and Communication Technologies (ICT) that includes Virtual Learning Environments (EVA).

It is stated that the State, in different countries, promotes and helps the student sector for better teaching regardless of the socio-cultural sector to which each person belongs. One of the fundamental rights of every human being is that of a decent education, this is made aware by the whole society to the point of associating said mechanics with better opportunities for a future job; Therefore, having access to an optimal education close to each person will be an opportunity for improvement.

The purpose of this research is based on the theme of how the use of ICT acts on the learning of students at the higher level and, in turn, how these influence the learning of phonology. Taking as the theoretical basis of meaningful learning (Ausubel, Novak and Hanesian, 1983) the same one that indicates that it would be fruitful to broach an element that stimulates the stagnant form of ICT teaching so that its ancestry in the learning of the field of phonology is then analyzed., making strenuous efforts to take advantage of the meager technological implementation of the public university in order to make the process more dynamic and thereby try to raise the low levels of learning from the academic experience in question by university students.

Regarding the field of art, the work of Simões and Faustino (2019) described how ICTs work for the stimulation and motivation of higher education students from the perspective of teachers of mother tongue and foreign language courses. The conclusions that ICT achieved the objective of stimulating students are divided because there is a marked use of ICT in the first, justifying it by the different nature of the two courses. On this point, a similarity was found in Izquierdo and others (2017).

Another pertinent antecedent was the article by Fabre et al. (2017) on phenomenological design, which studies the problems that English language students (ELI) have to interact orally in that language within the teaching of the English language (EII). Acquiring phonological awareness is essential to improve pronunciation and communication skills in ELI, especially in the context of English as a Foreign Language (IIE) where students have limited access to interaction with native English speakers. Habte's article (2017) yielded similar results.

Martins, Carapinha and Viera (2017) carried out a research work on the teaching-learning of Portuguese as a foreign language from the use of a laboratory with sound production

software. The data collected in the PFL-TL laboratory and examined in this aforementioned study have contributed to a better understanding of the problems that can arise both in the learning process and in the teaching of language training by computer. The data on the participation of activities revealed the importance of favoring tasks that involve more interactivity and provide feedback.

Víctor and Bolanle (2017) investigated the scope of ICT regarding student teaching at Ondo's universities and institutes. The target population was made up of the 200 students in the universities and institutes of that state. Data were carefully collected using a questionnaire and analyzed using statistical data to test the null hypothesis.

The main pedagogical currents developed in its beginnings during the twentieth century were the behaviorist. For Skinner, education has the ultimate goal of training subjects so that they can adapt their behaviors and, in that way, they can ensure their personal survival of their cultures and species. The human being experiences a process called meaningful learning that pertains to previously acquired knowledge and that which already has a good time in memory.

The use of ICT always offers effective options for the educational field; However, for a long time, it was only connected to the issue of "reception of information", a subject that seeks memorial action, beyond reflection and interpretation; on the other hand, these tools show, through interactive and attractive tests, the collection of students' previous knowledge; As explained, it is important, many times, to delimit the initial experience of people when they are learning, the crossing of information is very beneficial for this; However, this does not manage to equate to daily life, a place where the significant learning achieved will be transferred.

In this theoretical framework, learning is defined as the action of linking the origins of information; And, furthermore, the connections through which learning takes place are more important than what students know. In connectivism, the focus for students is on the ability to access knowledge when needed, rather than the ability to retain knowledge in the long term. Due to academic progress and technological situations as mechanisms of aid for knowledge or learning, the now famous Massive Open Online Courses (MOOC) are a product generated by applying and developing the guiding principles of connectivism; as well as in the implementation of Personal Learning Networks (RAP).

Over the years, countless definitions for ICT have been tested. Among these, we can mention the one found in the United Nations Development Program (UNDP, 2002) since

this definition is not only framed by cutting-edge technologies without encompassing the traditional mass media: television stations, the telephone, radio stations. This is more appropriate since today there are still population groups partially and totally isolated from the network of networks; but they do have access to the aforementioned media.

In this document, the UNDP (2002) defines ICT as a whole divided into two parts: the first one that has as its exponent the traditional communication media called in the past Communication Technologies and that are constituted by television, telephony, and the radio; the second part represented by what is commonly known as ICTs composed of those that are digital such as networks, telematics, computing and, of course, the network of networks: the Internet.

Quilis (1993) defines phonology as the branch of linguistics that studies the sound system of leagues. Of the great variety of sounds that the human vocal apparatus can produce and that are studied by phonology, only a relatively small number are used in any language. Sounds are organized in a contrast system that is analyzed for phonemes, distinct features, or other similar phonological entities according to the theory used. Crystal (2003) states that the goal of phonology is to demonstrate the distinctive sound patterns that exist in a language and to express as generally as possible about the nature of sound systems in world languages.

Regarding the ICT variable, it is defined as a group of new information technologies, which are based on three pillars: telecommunications connections, computing, electronics; linked, which converge and connect to achieve innovative communicative realities (Cabero, 1998).

On the learning variable, it is defined in essence as the process or series of processes that allows the individual to obtain cognitive abilities; adopt a series of behaviors and values; be able to improve, modify ideas; all this as a result of pedagogical instruction, experiences, culture, reason or reflection.

Method

This work is part of the positivist paradigm, of applied methodology, quantitative approach with pre-experimental design since the objective was to know the differences found in the experimental group before and after the development of each of the four learning units of the subject. Phonology; it was experimental with respect to the independent variable (Campbell and Stanley, 1967). The use of ICT was studied in order to discover how this variable has an impact on the learning of phonology in university collaborators (students) of a public university. For this case, the independent variable is the use of ICT and the group

to which it is subjected is called the experimental group. There was only one single group: the experimental one.

Institutional evaluation has been used as a technique. For this purpose, the results obtained by the student-collaborators of both their pre-test and their post-test have been taken into consideration. The pretest of the evaluation of the competences of the students of the third cycle of the Linguistics specialty consists of sixteen (16) multiple-choice questions and four (4). Thus, there are four pre-tests that will be applied throughout the fourteen (14) weeks of the academic cycle or semester, the same ones that correspond one by one with the learning units. The post-test was done with the support of TIC through a structured performance and concepts test, which consisted of 16 multiple-choice questions and four (4) development questions, which included cases for analysis and the application of the PRAAT software. This post-test was contrasted with the initial results obtained with its respective pre-test, in order to determine the level at which ICTs influenced the training of the phonology subject. The Kruskal-Wallis test was applied since they are suitable for contrasting the results of longitudinally related groups. Thus, the two stages in which the experimental group was, corresponding to the pre and post application of the treatment Use of ICT for the learning of phonology were analyzed. The ICT, within this research, contains the didactic strategies focused on the use of PRAAT audio software, use of the internet and multimedia tools such as speakers, microphones, headphones, etc. in order to determine the level at which ICTs influenced the training of the phonology subject. The Kruskal-Wallis test was applied since they are suitable for contrasting the results of longitudinally related groups. Thus, the two stages in which the experimental group was, corresponding to the pre and post application of the treatment Use of ICT for the learning of phonology were analyzed. The ICT, within this research, contains the didactic strategies focused on the use of PRAAT audio software, use of the internet and multimedia tools such as speakers, microphones, headphones, etc. in order to determine the level at which ICTs influenced the training of the phonology subject. The Kruskal-Wallis test was applied since they are suitable for contrasting the results of longitudinally related groups. Thus, the two stages in which the experimental group was, corresponding to the pre and post application of the treatment Use of ICT for the learning of phonology were analyzed. The ICT, within this research, contains the didactic strategies focused on the use of PRAAT audio software, use of the internet and multimedia tools such as speakers, microphones, headphones, etc. Thus, the two stages in

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Approval has been requested from each of the twenty (20) students taking the subject of phonology in the specialty of Linguistics and who are going to participate in the application of the treatment Use of ICT for learning phonology.

Results

The treatment that presented the greatest change was treatment four, which changed from 11.25 in the evaluation before the application of the use of ICT to a mean of 18.40 after the application of the use of ICT; the treatment with the least change was treatment 1 which changed from a mean 8.35 before the application of ICT use to 15.45 after the application of ICT use.

Table 1 Comparison by means of treatments, before and after the use of ICT

Dependent variable	Treatments	N	Half	Standard deviation	Standard error	95% confidence interval for the mean	
						Lower limit	Upper limit
Learning Pre Phonology	T1	twenty	8.35	2,033	, 455	7.40	9.30
	T2	twenty	9.10	1,447	, 324	8.42	9.78
	T3	twenty	8.20	1,105	, 247	7.68	9.72
	T4	twenty	11.25	1,164	, 260	10.71	11.79
	Total	80	9.23	1,903	, 213	8.80	9.65
Learning Post Phonology	T1	twenty	15.45	2,665	, 596	14.20	16.70
	T2	twenty	16.05	1,638	, 366	15.28	16.82
	T3	twenty	17.10	1,252	, 280	16.51	17.62
	T4	twenty	18.40	, 821	, 184	18.02	18.78
	Total	80	16.75	2,041	, 228	16.30	17.20

In dimension 1, understanding of concepts, a p value of sig is observed. = 0.000 that being less than 0.05 the null hypothesis is rejected and the alternative hypothesis is accepted. The median score in the post-test is significantly higher than the median score observed in the pre-test. In dimension 2, discrimination and production of phonemes, a value of sig is observed. = 0.000 that being less than 0.05 the null hypothesis is rejected and the alternative hypothesis is accepted. The median post-test score is significantly higher than the median pre-test score. In dimension 3, phonological problem solving, a value of sig is observed. = 0.000 that being less than 0.05 the null hypothesis is rejected and the alternative

hypothesis is accepted. The median post-test score is significantly higher than the median pre-test score.

Table 2 Comparison with the Wilcoxon test that analyzes the improvements obtained when applying the use of ICT in the meaningful learning of phonology in university students

Hypothesis system	Variable / dimension	Test	Z	s	Decision
HG: ICTs significantly influence the Learning of Phonology in students of a university in Lima.	Meaningful Learning of Phonology	Wilcoxon	-7,727	,000	The General Hypothesis is accepted
HE1: ICTs significantly influence the understanding of concepts of the phonology subject in university students of a public university in Lima in 2020	Understanding of Concepts	Wilcoxon	-7,816	,000	Hypothesis 1 is accepted
HE2: ICTs significantly influence the production of phonological sounds with the support of PRAAT software in the subject of phonology in university students of a public university in Lima in 2020.	Discrimination and Production of Phonemes	Wilcoxon	-7,566	,000	Hypothesis 2 is accepted
HE3: ICTs significantly influence the resolution of phonological problems in the subject of phonology in university students of a public university in Lima in 2020	Resolution of Phonological Problems	Wilcoxon	-7,800	,000	Hypothesis 3 is accepted

The results of table 10 are evidences that the application of the use of ICT significantly influences the Meaningful Learning of Phonology in students of a public university in Lima. The general hypothesis proposed for the present investigation is accepted.

Table 3 Comparison using the Kruskal Wallis test to analyze the improvements obtained when applying the use of ICT in the learning of phonology in university students of a university in Lima

	Null hypothesis	Test	S.I.G.	Decision
1	The Pre-Phonology Learning distribution is the same among the Treatment categories.	Kruskal-Wallis test for independent samples	,000	Reject the null hypothesis
2	The Post Phonology Learning distribution is the same across the Treatment categories.	Kruskal-Wallis test for independent samples	,000	Reject the null hypothesis

The results obtained in the Kruskal Wallis test in the post-test (sig. = 0.0650.05) allow us to affirm that the scores of the median of the 4 treatments in the dimension compression of concepts in phonology are statistically equal; that is, the four treatments in the posttest are not statistically different.

Table 4 Comparison using the Kruskal Wallis test to analyze the improvements obtained when applying the use of ICT in the understanding of phonology concepts in university students

	Null hypothesis	Test	S.I.G.	Decision
1	The Pre Concepts Comprehension distribution is the same across the Treatment categories.	Kruskal-Wallis test for independent samples	, 000	Retain the null hypothesis
2	The Post Concepts Comprehension distribution is the same across the Treatment categories.	Kruskal-Wallis test for independent samples	, 000	Retain the null hypothesis

The results obtained in the Kruskal Wallis test in the post-test (sig. = 0.0000.05) allow us to affirm that the scores of the median of the 4 treatments in the dimension discrimination and phoneme production are statistically different, that is, the four treatments in the post-test are statistically different.

Table 5 Comparison using the Kruskal Wallis test to analyze the improvements obtained when applying the use of ICT in discrimination and production of phonemes in the learning of phonology in university students

	Null hypothesis	Test	S.I.G.	Decision
1	The distribution of Discrimination and Production of Pre Phonemes is the same among the Treatment categories.	Kruskal-Wallis test for independent samples	106,000	Reject the null hypothesis
2	The distribution of Discrimination and Production of Post Phonemes is the same between the categories of Treatments	Kruskal-Wallis test for independent samples	, 000	Reject the null hypothesis

The results obtained in the Kruskal Wallis test in the post-test (sig. = 0.0000.05) allow us to affirm that the median scores of the 4 treatments in the dimension solving phonological problems are statistically different; that is, the four treatments in the posttest are statistically different.

Table 6 Comparison using the Kruskal Wallis test to analyze the improvements obtained when applying the use of ICT in the Solving of Phonological Problems in university students

	Null hypothesis	Test	S.I.G.	Decision
1	The Pre Problem Solving distribution is the same across the Treatment categories.	Kruskal-Wallis test for independent samples	, 000	Retain the null hypothesis
2	The Post Problem Solving distribution is the same among the Treatments categories.	Kruskal-Wallis test for independent samples	, 000	Reject the null hypothesis

Discussion

The contrast of the general hypothesis was extracted from the evidences of the descriptive Wilcoxon signed rank test, the Kruskal-Wallis test with Bonferroni post hoc comparisons, descriptive that were shown to be pertinent since the results of the four treatments for The dependent variable and its dimensions were different as indicated by the p value 0.000 than when it was less than the 0.05 level of significance established for the study. This has allowed to conclude that the application of the use of ICT significantly influences the meaningful learning of phonology in students of a public university in Lima.

Based on the above, the general hypothesis proposed for the research has been accepted, the results of which showed that the proposed analysis model was the relevant one since the tests explained that the four treatments of the dependent variable with its three dimensions had different results. as indicated by the p value (.000) and z (-7.727) in the Wilcoxon signed rank test for the variable significant learning of phonology.

With the Wilcoxon signed rank test, the three dimensions of the dependent variable obtained the following values. Concept comprehension, its p value was.000 and its z was -7.816; discrimination and production of phonemes, its p value was.000) and its z was -7.566; when solving phonological problems, his p value was.000) and his z was -7,800, all different results. This has allowed to conclude that the use of ICTs significantly influence the meaningful learning of phonology in students of a public university in Lima.

The same happened when the Bonferroni post hoc comparison tests were carried out, which allowed us to compare the results obtained in the scores of each treatment between the pretest and posttest. These results showed that the statistical model was the relevant one for the variable under study. Likewise, the treatment that presented the greatest change was treatment 4, which changed from 11.25 in the evaluation before the application of the use of ICT to an average of 18.40 after the application of the use of ICT; the treatment with the least change was treatment 1 which changed from a mean 8.35 before the application of ICT use to 15.45 after the application of ICT use.

The above has been evidenced from the fact that the descriptive of the four treatments of the dependent variable significant learning of phonology (p value (.000) and z (-7.727)) with its three dimensions: understanding of concepts (p value (.000) and z (-7,816)), discrimination and production of phonemes (p value (.000) and z (-7,566)) and resolution of phonological problems (p value (.000) and z (-7,800)) had different results as This is indicated by the Wilcoxon signed rank test, unanimously for the use of ICT.

In Izquierdo and others (2017), a similar panorama is presented as that observed in Simões and Faustino (2019). Thus, in this last work it can be evidenced that there is a close relationship between the motivation on the part of the students who use ICT with the dimension of solving phonological problems of the present work, since by being able to solve problems with solvency with the help of these the motivation of the latter is increased. Thus, Siemens (2004) has described the role of the teacher as 'curator, an expert student who creates spaces in which knowledge can be created, explored and connected'. He has also pointed out that the textbook has become less important as a source of knowledge, as the Internet has made it easier for students to gain experience in almost any field.

The present research is in line with what is proposed in the article by Fabre and others (2017) regarding the importance of the acquisition of phonological awareness. ICTs will make it possible to achieve the acquisition of the phonological awareness that is required to achieve the objectives required by the aforementioned reference. The latter is strengthened in the results that the present work has produced, since from the fact that the descriptive of the four treatments of the dependent variable significant learning of phonology (p value (.000) and z (-7.727)) with their three dimensions: understanding of concepts (p value (.000) and z (-7,816)), discrimination and production of phonemes (p value (.000) and z (-7,566)) and resolution of phonological problems (p value (.000) and z (-7,800)) had different results as indicated by the Wilcoxon signed rank test. Given that Habte (2017) shows results similar to those of Fabre and others (2017); Since in this work, as in the first, the Integrated Learning of Contents and Foreign Languages (CLIL, given its acronym in English) is addressed and being that for this purpose the acquisition of phonological awareness is also essential, with which the You will obtain the improvement of the pronunciation and communication skills of English, in a similar way, from what is concluded in this thesis, the learning of Phonology through ICT will allow to achieve the acquisition of such awareness required to achieve the skills required the Habte (2017) reference. The latter is also corroborated in the results that this work has produced.

As a sample that supports the above are the data that have been obtained in the current investigation from the fact that the descriptive of the four treatments of the dependent variable significant learning of phonology (p value (.000) and z (-7.727)) with its three dimensions: understanding of concepts (p value (.000) and z (-7,816)), discrimination and production of phonemes (p value (.000) and z (-7,566)) and resolution of phonological problems (p value (.000) and z (-7,800)) had different results as indicated by the Wilcoxon signed rank test. This has allowed us to conclude, in the present investigation as in that of

Guerrero (2016), that the use of ICT is important to have achieved the competences in the teaching-learning process. In this work, for example.

The partial concordance between these two studies shows the scope that ICT had in the teaching-learning process, since both in the environments where ICT was used the objectives of these processes were achieved with more success in comparison in which they were not used. This statement is confirmed with the results obtained through the descriptive ones that analyzed the four treatments of the dependent variable Significant Learning of Phonology (p value (.000) and z (-7.727)) with its three dimensions: Understanding of Concepts (p value (.000) and z (-7,816)), Discrimination and Production of Phonemes (p value (.000) and z (-7,566)) and Resolution of Phonological Problems (p value (.000) and z (-7,800)) obtaining results different as indicated by the Wilcoxon signed-rank test.

The latter is more clearly evident in the concept compression dimension. This has allowed to conclude that the use of ICTs significantly influence the meaningful learning of phonology in students of a public university in Lima in the present investigation and the achievement of pedagogical objectives by students in the universities and institutes of Ondo in Victor and Bolanle (2017).

Conclusions

From the results that could be obtained, it is feasible to say that the primary objective of this research has been fulfilled, the same one that focused on determining the influence that the use of ICT has on the learning of the subject of phonology in university students from a public university in Lima in 2020. The data obtained as a result of the mean values before and after the use of ICT in the four treatments for the three dimensions have proven that the treatment that the greatest change was treatment 4, which changed from 11.25 in the evaluation before the application of the use of ICT to an average of 18.40 after the application of the use of ICT; the treatment with the least change was treatment 1 that changed from a mean of 8.

Likewise, specific objectives 1, 2 and 3, respectively, were met, determining that the use of ICT significantly influenced the dimensions of understanding concepts, discrimination and production of phonemes, and resolution of phonological problems of the dependent variable significant learning. of phonology. The verification of hypotheses by means of the tests of the Wilcoxon signed ranks showed that the general hypothesis as well as the specific hypotheses were accepted because they obtained a p value of .000, therefore the null hypotheses had to be rejected.

It is proved that the results obtained with the Kruskal Wallis test in the pretest (sig. = 0.000 0.05) allow rejecting the null hypothesis and affirming that the scores of the median of the 4 treatments are statistically different; and that the results obtained with the Kruskal Wallis test in the posttest (sig. = 0.000 <0.05) allow rejecting the null hypothesis and affirming that the median score of the four treatments is statistically different; that is, the four treatments in the posttest are statistically different. Thus, these results are evidence that the application of the use of ICTs significantly influences the meaningful learning of phonology in students of a public university in Lima. The general hypothesis proposed for the investigation is accepted. Finally,

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