Distance English Language Learning: An Investigation of Students Attitudes and Effectiveness of the Method. The Case of Mechanical Engineering Students at the University of Science and Technology, Oran U.S.T.O-MB

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Abstract: The aim of the present study is to investigate the effectiveness of distance learning on the mechanical engineering students' academic achievement as well as to examine students' attitudes towards the method. To this end, thirty volunteering students were assigned into three groups. The groups received the same intensive ESP course presented through three different methods: the Traditional method, the Distance learning method, and the Language lab method. The results of One-way ANOVA and Scheffé post-hoc post-test showed statistical significant differences in favour of the distance learning group. Moreover, the analysis of the questionnaire responses demonstrated that the participants had developed negative attitudes towards their prior distance learning experience, however, their attitudes towards the distance learning ESP course implemented were positive.

Keywords: Distance Learning, asynchronous, students' attitudes, CALL, Language Laboratory, effectiveness, multimedia, ICT, ESP, Covid-19 pandemic.

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1. INTRODUCTION

Computers and the internet are considered among the greatest technological inventions of the twentieth century. Their impacts can be seen in every aspect of human's life, from social interaction to business transaction, from health care to entertainment. In fact, no civilised man can deny the importance of such ingenious inventions in facilitating people's modern life and shortening the distances between them through electronic telecommunications.

As any other domain, higher education has been affected by computer technologies and the internet. In fact, the use of these innovations to support teaching and learning has recently become much easier and feasible which has led to their massive exploitation especially by the new and young generation. As a result, many universities and colleges in the developed countries started to adopt distance and online learning as part of their program to increase access to higher education. Indeed, the demand for the new mode of instruction has rapidly increased from learners worldwide and from all walks of life.

In the developing countries, however, many teachers are still afraid of applying computer technologies in their classrooms and prefer to rely solely on the traditional 'chalk and talk' methodology which has over the years proved its failure in achieving the desired outcomes. Accordingly, the situation in Algeria is far from being different. Although the Ministry of Higher Education and Scientific Research has showed a great interest in modern teaching methodologies by equipping several universities across the country with advanced language laboratories, the great majority of these facilities are either closed or not operating at all. This situation has lead one to wonder what would possibly be the impact of these heavy-duty investments on the Algerian English language learners.

Moreover, by the end of December 2019, the world has witnessed the emergence of a deadly and highly-contagious respiratory virus called Covid-19. The virus was first discovered in Wuhan – China then spread so rapidly throughout the world that in less than three months it was declared as a global pandemic by the WHO (World Health Organization). In order to prevent the spread of the pandemic and reduce the number of casualties, individuals were ordered to stay home, all gatherings of more than ten people were prohibited to ensure social distancing. As a result, most colleges and universities in both developed and developing countries were forced to close their doors. The shift from traditional face-to-face classroom instruction to distance learning thus became inevitable since it was the only way for teachers to stay connected remotely with their students and ensure the continuity of the rest of the program. As a matter of fact, it seems that this transition was relatively smooth for developed countries (such as the Netherlands, Denmark, United States, Germany, United Kingdom, and Norway) that had already successfully implemented distance and online learning in their institutions prior to the Covid-19 pandemic. On the contrary, developing countries, like Algeria, that had failed to develop strategic plans for the crisis were not supposed to smoothly manage the shift towards distance learning as they had witnessed a lack of integration of modern technologies in their higher education system.

Researches on the effectiveness of CALL (Computer-Assisted Language Learning) and distance learning have been ongoing for decades but it was not until the early 1990s when multimedia was first introduced that studies began to provide quantitative evidence for the real potential impact of the new technologies on language teaching and learning. The most convincing way of assessing the effectiveness in a computer technology language learning environment is the use of an experimental design in combination with the measurement of learners' performances. Chapelle (2001) suggests researchers to follow a design that involves

conducting a pre-test at the outset of the experimentation and an immediate post-test upon completion of the treatment. In order to get stronger evidences of the potential effectiveness of the method a researcher want to assess, Chapelle further recommends employing a control group that does not receive any intervention and then compare the difference in gains.

As a matter of fact, this type of research methodology is very rare in Algeria. To the researcher best knowledge, only few numbers of studies have been conducted to measure the effectiveness of CALL and distance learning on language teaching and learning. A deep investigation into the Algerian database of researches has yielded no true experimental study except maybe that of Saidouni (2019), Nachoua (2012), Reffas (2021) and Meddour (2006). Most of the other studies claiming the effectiveness of CALL or distance learning have based their results on questionnaires, interviews, and descriptive accounts while discussing the attitudes of teachers or students towards the methods. Indeed, this was one of the underlying motivations behind conducting the present study.

The aim of the present study is to examine students' attitudes as well as the effectiveness of distance learning in improving the mechanical engineering students' academic achievement. The study is guided by the subsequent research questions:

1. What is the most effective method for improving the achievement scores of the Algerian mechanical engineering students?
2. What are the attitudes of first year mechanical engineering students towards the distance learning?

2. Methodology

This study was quantitative in nature following a comparative experimental pre-test post-test design. The population included first-year undergraduate students from the

Mechanical Engineering Department at the University of Sciences and Technology Oran USTO-MB. The sample consisted of thirty students among whom sixteen males and fourteen females who willingly volunteered to participate in this study. All students were native speakers of Arabic and their age varied between eighteen and twenty years old. These freshmen were randomly assigned to one of the following groups: Traditional group, Distance Learning group or Language lab group. The Distance Learning and the Language lab groups acted as an experimental group whereas the Traditional group served as a control.

At the beginning of the experiment, all participants completed a computerised pre-test in the language lab at the Mechanical Engineering Department. After completion, and during a ten weeks period, all students were exposed to an intensive ESP course of the same content instructed by the same teacher but using different methods; the control group was taught by the conventional method of teaching, the Language lab group was taught in the language lab where each student was equipped with a personal computer linked to the SANAKO system, while the distance learning group was instructed asynchronously at a distance with a learning material integrated with sounds, pictures, and video files sent via email. Immediately at the end of the treatment, all participants took a computerised post-test in the language lab as well as a paper-based questionnaire measuring their attitudes and preferences towards the implemented teaching methods. The tests results of the three groups were statistically analysed using One-way ANOVA and Scheffé's Post-hoc Post-test calculated in the SPSS software version 20.

3. Results

3.1 Pre-test and post-test results

3.1.1 Homogeneity test

Table 1. Pre-test Mean Scores and Standard Deviation

	N	Mean	Std. Deviation	Minimum	Maximum
Traditional group	10	14,1750	2,98154	10,25	19,50
Distance learning group	10	14,0000	1,88930	11,00	17,00
Language lab group	10	13,0750	1,82593	10,00	15,50
Total	30	13,7500	2,26765	10,00	19,50

In order to test the validity of the first hypothesis of the present study, a statistical method was followed. But before being able to test the validity of the hypothesis it was first necessary to check the homogeneity the three groups formed. The statistical analysis of students' pre-test mean achievement scores presented in table 1 indicated that the three groups of the study had very close mean values (Traditional group = 14.17, Distance learning group = 14.00, Language lab group = 13.07). However, that was not enough to confirm the homogeneity of the groups.

Table 2. One-Way ANOVA Pre-test Results

	Sum of Squares	Df	Mean Square	F	Sig.
Inter-groups	6,988	2	3,494	,664	,523
Intra-groups	142,138	27	5,264		
Total	149,125	29			

The results of the One-Way ANOVA in table 2 indicate that there was no statistical significant difference between the pre-test scores of the three groups (sig = 0.52 > 0.05). Therefore, before the intervention, the three groups were homogeneous in their English learning achievements.

3.1.2 Testing Hypothesis N°1: Distance learning is an effective method in improving the Algerian mechanical engineering students' achievement scores.

Table 3. Post-test Mean Scores and Standard Deviation

	N	Mean	Std. Deviation	Minimum	Maximum
Traditional group	10	7,7250	2,53161	3,50	11,50
Distance learning group	10	13,6250	1,61697	10,00	15,50
Language lab group	10	17,6000	1,05541	15,50	19,25
Total	30	12,9833	4,49134	3,50	19,25

After the intervention, a noticeable difference in the mean scores of the three groups was observed. The Traditional group, the Distance learning group and the Language lab group got a mean score of 7.72, 13.62, and 17.6 respectively (see table 3). Although there seems to be a difference in the mean scores of the three groups, no statistical significant difference can be acknowledged. Consequently, the One-way ANOVA was processed to probe the potential statistical significant difference between the three groups.

Table 4. One-Way ANOVA Post-test Results

	Sum of Squares	Df	Mean Square	F	Sig.
Inter-groups	493,754	2	246,877	73,059	,000
Intra-groups	91,238	27	3,379		
Total	584,992	29			

The results of the One-way ANOVA analysis of the post-test computed at the 0.05 level of significance obtained the value of sig. = 0,000 (see table 4). This means that there was a statistical significant difference between the three groups after the intervention (sig = 0.000 < 0.05). After establishing a significant difference in the post-test achievement scores of the three groups, Scheffé's Post-Hoc test was chosen to determine the direction of the differences. Being able to determine the direction of the differences combined with the information obtained from table 3 concerning the means values of the three groups will allow us to classify the three methods applied from the least effective to the most effective method. The computational results of Scheffé's Post-Hoc test are presented in table 5.

Table 5. Scheffé's Post-hoc Post-test Mean Scores

(I) method	(J) method	Mean Difference (I-J)	Sig.
Traditional group	Distance learning group	-5,90000*	,000
	Language lab group	-9,87500*	,000
Distance learning group	Traditional group	5,90000*	,000
	Language lab group	-3,97500*	,000
Language lab group	Traditional group	9,87500*	,000
	Distance learning group	3,97500*	,000

The results in table 5 indicate that the mean difference between the Traditional group and the Distance learning group was statistically significant in favour of the Distance learning group with an estimate value of -5.90. Moreover, a comparison between the Traditional group and the Language lab group showed a statistical significant difference in favour of the Language lab group with a mean difference score of -9.87. Significant

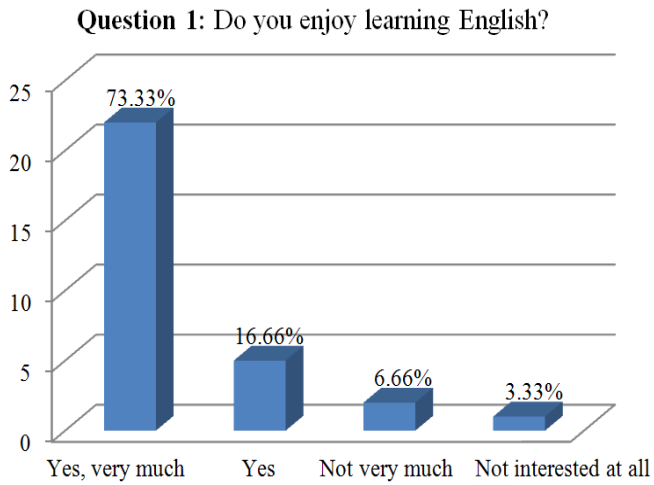
difference was also found between the Distance learning group and the Language lab group in favour of the latter (Mean Difference = -3.97).

Since the Language lab group's statistical mean was the highest mean (17.60) followed by the Distance learning group's mean with (13.62) while the Traditional group's statistical mean came last (7.72) (see table 3), and from the above results related to the direction of the differences, it can be deduced that the Distance learning method is more effective than the traditional method and the Language Lab method is the most effective method amongst the three methods examined. Under these conditions, the null hypothesis (H0) is therefore rejected and the hypothesis (H1) claiming that: 'Distance learning is an effective method in improving the Algerian mechanical engineering students' achievement scores' is accepted.

3.2 Questionnaire results

Testing Hypothesis N°2: The Algerian mechanical engineering students have positive attitudes towards distance learning?

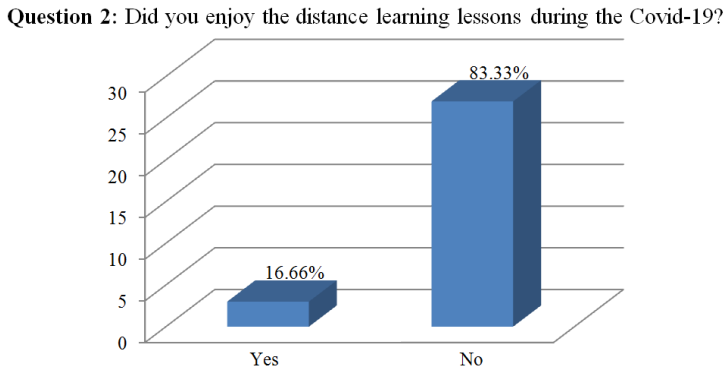
Fig.1. Students' Attitudes towards Learning English



The first question aimed at measuring students' attitudes towards the English language learning in general. As it can be read from figure 1, 73.33% of the students enjoyed

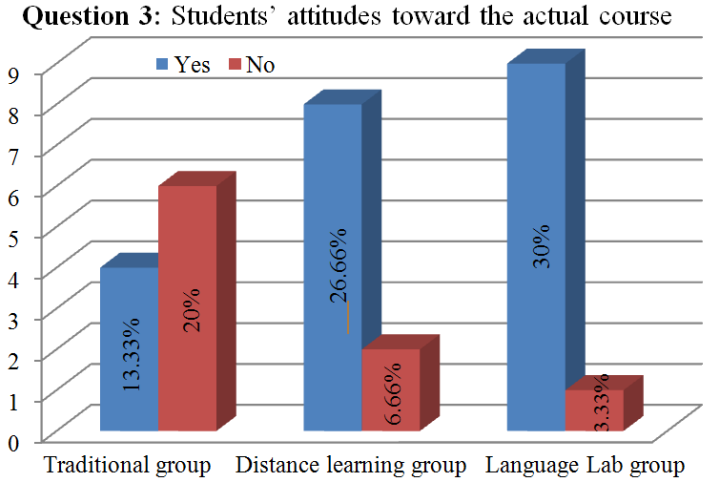
learning English very much, 16.66% answered the question with a simple yes, 6.66% did not enjoyed it very much, and only a single student (3.33%) was not interested at all in learning English. Overall, the vast majority of the students (90% ≅73.33%+16.66%) showed positive attitudes towards learning English.

Fig.2. Students' attitudes towards their prior distance learning experience



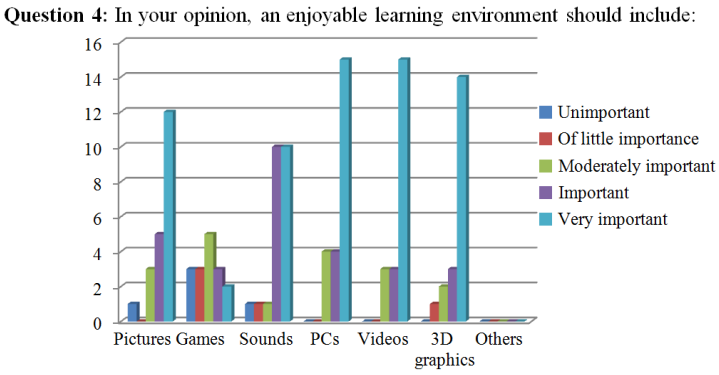
In the second question, students were asked whether they enjoyed their prior distance learning experience during the Covid-19 pandemic. By referring to figure 2, it is obvious that the majority of students (83.33%) did not enjoy the lessons received during the pandemic while a small minority (16.66%) enjoyed it.

Fig.3. Students' attitudes toward the actual course



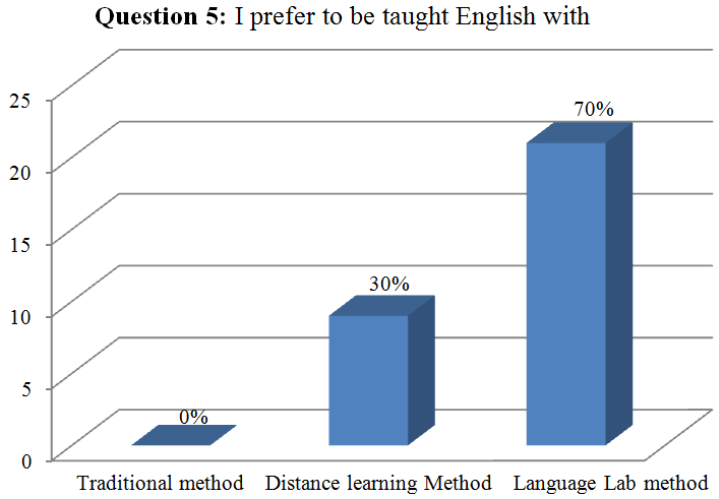
The third question was about students' attitudes towards the ESP course they enrolled in. The data from figure 3 show that a high percentage of students (70% = the sum of 'Yes' answers for the three groups) enjoyed the ESP course while a minority (30%) did not enjoyed it much. When the results of the three groups were compared to each other, the Language lab group ranked at the top (30% of 'Yes' answers) and the Distance Learning group ranked second (26.66% of 'Yes' answers). Additionally, it can be noticed that the Language Lab and Distance Learning groups significantly displayed higher positive attitudes (30% and 26.66% of 'Yes' answers respectively) towards the language lab and distance learning methods in contrast to the Traditional group who showed moderately negative attitudes towards the traditional method ('Yes'=13.33% and 'No'=20%).

Fig.4. Elements of an enjoyable learning environment



In regards to question 4, students were asked to provide their opinion about the elements that should additionally be included in a classical classroom to transform it into a more enjoyable learning environment. Results from figure 4 show that an enjoyable learning environment, according to the participants, is a computer technology environment where different multimedia elements such as sounds, pictures, videos, and 3D graphical representations are integrated.

Fig.5. Students' preferred teaching method



Proceeding to the last question which invited the participants to bring forth their mostly preferred teaching method, 70% of the students favoured the Language lab method and 30% preferred the distance learning method, while none of students (0%) preferred to be taught English using the regular method of instruction.

4. Discussion

After the implementation of the ESP course, the One-way ANOVA and Scheffé results of the post-test mean achievement scores showed statistical significant differences at 0.05 level in favour of the experimental groups. Hence, the experimental group's improvement could be reasonably attributed to the presence of computer technology in the distance learning and the Language lab teaching methods applied. This finding came in line with the studies of Bhatti (2013), Hamouda (2008), Kim (2012), Kırkgöz (2011), Mohamadkhani et al. (2013) and Nachoua (2012) and in which experimental groups taught using computer technology demonstrated better language achievement than that of a control group who received the traditional method of instruction. Additionally, a comparison between the study groups revealed that the distance learning method appears to be more effective than the

traditional method. This finding helped us to confirm our first hypothesis stating that distance learning is an effective method in improving the Algerian mechanical engineering students' achievement scores.

A linear interpolation between the current finding and students' answers to question 4 from the questionnaire leads one to attribute these results to the dual-coding theory proposed by Paivio (1971). According to this theory, memory and cognition are allocated in two separate regions of the human brain; one deals with verbal and textual information, the other processes nonverbal information such as visual inputs and surrounding sounds. Although the two regions are independent from each other, Paivio and Begg (1981) found that these regions still do intercommunicate and therefore, the information represented in one region can activate the other information stored in the other region of the brain. Accordingly, using computer technology for presenting lessons in a multimedia-rich learning environment incorporating sounds, pictures, videos and 3D graphical representations facilitates the activation of the brain's verbal region. Consequently, it seems quite logical that the Distance learning group who received multimedia instruction using computer technology achieves better scores than the control group who had been taught using the conventional method in a regular classroom environment.

Moreover, participants' responses to question 3 indicated that the Distance learning group showed higher positive attitudes towards the distance learning method ('Yes' = 26.66% 'No' = 6.66) in comparison to the traditional group which demonstrated moderately negative attitudes towards the classical method ('Yes' = 13.33% 'No' = 20%). These results and the ones obtained from the post-test analysis suggest a bidirectional correlation between students' attitudes towards the distance learning method and their achievements scores. In other words, this means that students who have positive attitudes towards distance learning usually get higher scores and those who get higher scores are usually those students who

have positive attitudes towards distance learning.

A further statistical comparison between the Language lab group and the Distance learning group revealed that the Language lab method is more effective than the distance learning method. In fact, the language lab method was identified as the most effective method among the three methods applied. These results were confirmed by reviewing responses to question 3 and 5 and in which students expressed their positive attitudes and high preference towards the language lab method. A possible explanation for this result could mainly be related to the distance and interaction between the teacher and the learner during the educational process.

On one hand, the teacher-students interaction for the distance learning group was primarily computer mediated involving asynchronous text-based exchanges via emails. Students of this group were encouraged to engage in self-paced learning and exercise more autonomy. Based on the Theory of Transactional Distance by Moore (1993), the increase of learners' autonomy and the decrease of teacher-students interaction create a space of potential misunderstanding between the inputs of the teacher and those of the learners. This could be the reason why distance learning group had lower achievement scores than the language lab group. On the other hand, students of the Language lab group had the possibility to receive immediate feedback while interacting face-to-face with their instructor and peers. Immediate feedback makes learning more meaningful and keeps students motivated which itself leads to more effective performance and better learning achievement.

Furthermore, the second research question was addressed based on the collection of the data gathered from the questionnaire distributed immediately at the end of the experiment. The results of the first question revealed that the majority of the participants (around 90%) have a positive attitude towards learning English in general. It has been generally maintained that a successful implementation of any particular innovative language

education approach or method depends, to a great extent, on students' attitudes. Indeed, positive attitudes can raise students' motivation, interest and will to learn which most often results in a better learning achievement, whereas negative attitudes can decrease their motivation and cause them to lose interest and fail to progress in their learning.

Concerning students' attitudes towards their prior experience with distance learning, the results withdrawn from the analysis of question 2 indicated that a high percentage of students (83.33%) who had previously been taught in a distance learning environment have developed negative attitudes towards the distance learning method they had been instructed with. This result is far from being an isolated case, many Algerian researchers have reported similar negative attitudes results in their distance or online learning-related studies (Benghalem, 2021; Khattala & Houichi, 2021; Boumekah & Debieche, 2021; Benadla & Hadji, 2021; Chadi & Chorfi, 2021; Hadjeris, 2021). In fact, students' first experience with distance learning was during the Covid-19 pandemic. It was part of the emergency online mode of instruction adopted by the Algerian University as a temporary measure to save the academic year. However, this mode of instruction has proven to be unsuccessful due to the existence of many barriers such as the lack of teachers' experience and training, the lack of students' motivation, hardware and software issues, and the lack of internet accessibility (Hadjeris, 2021). Eventually, it was the failure of implementing an efficient online mode of instruction during the Covid-19 pandemic that has led students to develop negative attitudes towards distance learning.

Moreover, the analysis of students' responses to question 3 revealed overall positive attitudes among students of the three study groups towards the ESP course they had attended. This result is congruent with the main findings of a prior study with a larger scale sample of fifty students conducted by Izidi and Zitouni (2017) at the same Department of Mechanical Engineering and in which students' positive attitudes towards ESP had also been

noticed. Additionally, and contrary to the negative attitudes students expressed towards their previous distance learning experience, students of the Language lab and the Distance learning groups expressed significantly positive attitudes towards the language lab and the distance learning methods respectively (this result, in part, confirm our second hypothesis which states that students have positive attitudes towards the implemented distance learning method), whereas students of the Traditional group showed moderately negative attitudes towards the traditional method. A further comparison of these results with the ones obtained from the statistical comparison of three teaching methods applied in this study leads one to deduce a possible relationship between students' attitudes and the teaching method. Students' attitudes are affected by the teaching methods used (Luntungan, 2012; Sugano & Mamolo, 2021). The more effective the teaching method, the higher positive attitudes will be expressed by the students.

Regarding the last question, students were invited to provide their opinion concerning their preferred teaching method. The analysis of students' responses presented in figure 3 demonstrate that the majority of students (70%) favoured the Language lab method and the minority (30%) preferred the distance learning method while none of the participants showed interest in being taught English using the regular method of instruction. This means that students at the Department of Mechanical Engineering are not satisfied with the EGP lessons received via the regular method and are looking for more effective and enjoyable alternatives to improve their English language skills. In fact, these students are demonstrating the willingness to cope with ESP lessons instructed in the language lab but they are still hesitant regarding the implementation of distance learning.

5. Conclusion

The current study has attempted to examine the effectiveness of an asynchronous ESP course in improving the academic achievement of first year mechanical engineering students as well as measuring their attitudes towards distance learning. Based on the analysis of the results we can conclude that the mechanical engineering students have negative attitudes towards the lessons presented during the Covid-19 pandemic, however, they have demonstrated overall positive attitudes towards the asynchronous distance learning ESP course they have enrolled in. In addition, the comparison of students' achievement revealed that distance learning is more effective than the traditional method and the language lab method is the most effective one. The researcher wants to draw attention to the fact that although the Language lab method has proven to be the most effective teaching method amongst the three methods applied, a Language lab should not be seen as a panacea for all language learning deficiencies. The Language lab itself is not a magic wand that is supposed to do all the necessary tasks by a simple mouse click, but rather a tool like any other that needs to be put in the hands of a trained educator in order to achieve the desired outcomes. Therefore, we suggest that teachers and technical staffs training should be taken into consideration before any future Language lab, CALL or distance learning implementations.

For future research, we recommend conducting complementary studies to explore the impact of synchronous distance learning and measure its effectiveness in comparison to the asynchronous mode of instruction. The use of social media platforms such as Facebook, Twitter, Instagram and WhatsApp is another area worth investigating in future researches since the majority of the present study participants reported a high frequency use of social networks.

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