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Adaptation of Instructional Design to Promote Learning in Traditional EFL Classrooms: Adobe Captivate for E-Learning Content

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ABSTRACT

The indispensability of ICT tools in EFL classrooms is rather taken for granted, often in a way to promote the teaching /learning experience. Accordingly, teachers more than ever are encouraged or even explicitly instructed to use different tools inside the classroom. However, the lack of a systematic approach that governs the design and the delivery of content has resulted in the misapplication, or in the failure to fully exploit the potential that technology brings to learning. Therefore, the current research attempts to adapt instructional design principles inside EFL classrooms to ensure a productive E-learning environment, through methodical control of the utilization of information and communication technologies. In pursuit of this endeavor, the current paper examines first, through a literature review, the concept of instructional design and its principles and how they can be incorporated inside traditional EFL classrooms. The methodology opted for relies on quantitative data collected from an experiment conducted on two middle school 4 MS (Middle School) classes. An experimental group received five lessons in which content was designed using Adobe Captivate and adhering to instructional design principles. On the other hand, a control group received five lessons with the same objective, yet with regular videos and media gathered from YouTube. The findings of the research divulge that creating content with instructional design principles in mind results in a classroom in which learners are engaged with tools throughout the whole session instead of just assistive devices used for a short activity or just to draw the attention of learners. However, it is clear that an EFL teacher cannot assume the role of an instructional designer but such a task needs to be assigned to instructional designers who need to work closely with teachers.

Keywords: *Instructional Design; E-Learning; ICTs; Teaching; EFL*

INTRODUCTION

There is no question that technology is increasingly recognized as a serious advantage in EFL classrooms. Nevertheless, the abundance of literature on the subject is hardly reflected in real-world practice (Carver, 2016; Domingo & Garganté, 2016; Hwang, Lai, & Wang, 2015). The latter is caused by a long list of difficulties and limitations related to the implantation of ICTs (Basal, 2015; Cook, 2017). The starting point of the current paper is on the concept of the use itself. One has to be aware of the difference between just bringing a piece of equipment to a classroom and fully adopting the latter to serve a designated purpose in an effective way. While the distinction between the two is rather obvious, studies dealing with the subject of education and technology neglect the fact that many technological devices were not developed for education in the first place, but they were often made to address specific issues. For instance, a quick glance at how computers are installed in a hospital reveals that they are a fundamental part without which doctors will not be able to perform effectively. Each device has a specific function and works in a well-established system to ensure both effectiveness and efficiency.

The picture changes dramatically when referring to a classroom. Although teachers are explicitly instructed to use technology, at least in the Algerian educational system, and provide rich e-learning content to learners, the questions raised are the same ones fueling the current research:

1. On what theoretical ground should technology be incorporated in EFL classrooms?
2. What are the elements that constitute a technology-enriched curriculum?
3. What are the advantages and limitations of adapting instructional design principles?
4. Who should design E-learning content that are going to be presented to learners?

In the quest to arrive at an answer to the first question, the research deems the utilization of technology inside classrooms as more than tools that are simply brought to aid with a particular teaching method. Instead, the practice of integrating ICTs or any kind of assistive technologies should be grounded on its own dedicated theories that account for the practice of design, the delivery of content, E-learning experience, results, and the assessment of the whole system. (Hokanson, Miller, & Hooper, 2008; Parrish, 2008; Young, 2008). Therefore, this research tries to promote the idea that the use of technology inside classrooms should be looked at as a science.

Then, the topic needs to be situated in a scientific field that meets all the prerequisites referred to above. Adding to that, it needs also to account for those aspects that are involved in an EFL classroom such as teachers, learners, syllabi, teaching methods and strategies, and evaluation. In the endeavor to select a field that best describes the interplay of all components in a school system and the integration of technology, Instructional Design stands as a prominent field that "is heavily influenced by advancements in learning theories, communication theories, and computer technology" (Keppell, 2007, p. 39).

To address the research questions, the paper starts with a literature review on the concept of instructional design and its relation to school context. Then, it ponders on the elements that constitute a technology-enriched curriculum. There will be frequent reference to the Algerian education system and the approach implemented in the latter, in an attempt to compare and assess the readiness of the system for the use of technology. After that, the methodology devised for the practical part will be discussed. Finally, the final conclusion will be drawn in light of the experiment results.

INSTRUCTIONAL DESIGN: SCIENCE OR ART

Botturi (2007) defines instructional design (ID) as "the knowing use of technology for the assistance of learning, and more recently, specifically the use of computer- and Internet-based technologies in the service of learning. (p.77). Botturi's view on ID offers all the ingredients this paper is searching for; however, it hardly reflects the complexity of the subject. Allen (2011) notes that it is both easy and challenging to define ID. The issue lies in how one tries to look at it. If the interest is the link between technology and learning, Botturi' s definition is sufficient. Nevertheless, according to Van Merriënboer and Kester (2008), ID promises to bring maximum efficiency to instruction as through its methods the required practice items can be minimized as well as time dedicated for learners to reach learning objectives, after all, the concept bears the label instruction. Therefore, even from the perspective of an instructional designer, technology is a tool.

While the utilization of tools is often encouraged in modern teaching approaches and methods, instructional designers lay weight on them to achieve meaningful, memorable, and motivational learning experience. An interesting comparison between advertising gurus and instructional designers can be drawn. An advertisement whether on television or delivered via the Internet remains an expensive product in which time dedicated is calculated by seconds. The ultimate aim of an advertiser is to influence the behavior of customers in thirty seconds. Instructional designers share the same idea. In fact, according to Rothwell and Kazanas (2011), the ones designing commercial adverts are often instructional designers. The latter takes into consideration minute details drawing knowledge from research on memory, motivation, psychology, and linguistics (Ertmer & Newby, 1993).

However, a quick review of the concept yields titles comprising the word “art”. Thus, the question of whether ID is a science or art is raised (Keller, 1987; Kruse & Keil, 2000; Marzano, 2007; Mijksenaar & Westendorp, 1999). There is no doubt that the quest to adopt ID in a classroom context necessitates tried-and-tested methods if any practical endeavor is to be pursued. In this vein, Allen (2011) noted that ID should be referred to as a craft, a combination of science and art. He sees the scientific side of the discipline manifested in the dependence on the human sciences of learning and educational psychology. On the other hand, creativity and imagination are two criteria that make a design stand out from the rest. For instance, while civil engineers should have knowledge of basic and essential elements that a design of a building needs to meet, often those who have creative imagination will make their design special. Similarly, even by adhering to known methods and techniques in teaching, teachers who enjoy a highly artistic level can present brilliant ideas that help in the design and the delivery of their lesson content.

INSTRUCTIONAL DESIGN THEORY

There is no question that the end goal of both learning and ID theories is to promote learning. However, learning theories suffer from a considerable disadvantage as they are descriptive and often do not offer practitioners solutions and clear ways to address issues that teachers and instructors encounter (Marsden, Mitchell, & Myles, 2013). For instance, although teachers come to classrooms equipped with knowledge of learning approaches and methods, they still require years of in-service training to efficiently translate such knowledge into practice.

On the other hand, instructional design theories are prescriptive in nature. They unequivocally offer comprehensive and replicable guidelines which must be followed by instructors to ensure attaining predetermined learning objectives. The latter renders the use of ID theories more applicable to educational problems (Reigeluth, 2013). The heavy emphasis on design and controlling the learning environment is reflected in three characteristics that need to be found in any ID theory. First, it needs to comprise one or several models of learning. Second, it has to explicitly specify conditions under which these models will be deployed. Third, it defines the desired or actual outcomes of the use of each model under a set of conditions. Instructional design theories are based on three important elements: effectiveness, efficiency, and appeal (Frick & Reigeluth, 1999).

Through the careful alignment of models with learning situations, ID theories and models endeavor to assure a greater probability of attaining learning objectives. Consequently, ID theories are called probabilistic methods as considerable attention is devoted to the design in an attempt to account for all the possible variables and scenarios that might arise during learning. Though it would be impossible to assume that an instructional design theory will achieve a hundred percent success, the goal is to achieve the highest probability (Jitwiriya, Thangkabutra, & Natakuatoong, 2018). Efficiency is another crucial element in measuring the success of instruction, as reaching the desired outcomes should be considered in relation to cost and time. Hence, evaluation in instructional design theories is more about the efficiency of the methods used than the outcomes. In fact, it should be noted that learners’ outcome is only a part of instructional design theories as the focus is on the instruction. The appeal of the instruction is a vital aspect to instructional designers as the first two elements can hardly exist without learners being interested and having the will to continue learning (Jitwiriya et al., 2018).

E-LEARNING

E-learning is “the delivery of education including the activities of instruction, teaching, learning, and assessment through various electronic media” (Alzaghoul, 2012, p. 27). Although the definition may seem to apply only to universities or institutions, it extends beyond that. For instance, when a company sells a product around the world and needs to inform customers about the way it works

or probably a method to update it, the best way to do so would be by using the Internet. However, information on the Internet needs to be designed in a way to be comprehensive for everyone. E-learning takes the usual image of the teacher with learners and makes an environment where learners are in charge of their own learning, manipulating information, and assessing their performance. It takes the idea of student-centered learning to another level.

The subject of ID is always brought up with the concept of E-learning as the goal of instructional designers is to exploit technological tools as much as possible to replace the traditional role of the teacher (Pelet, 2019). The utilization of machinima is a rather good example of how one can do wonders with cinematic videos generated by video game engines and voiceovers. In fact, such videos can have more appeal than a teacher standing explaining the content of a video (Brown, 2014). The possibility of designing a lesson without the existence of a teacher for delivery is the real reason behind selecting ID as a theoretical framework to integrate technology in a traditional classroom (Jonassen et al., 2008).

INSTRUCTIONAL DESIGN AND CURRICULUM DEVELOPMENT

Instructional design theories are based on the assumption that "if a product does not teach, it has no value" (Merrill, 2006, p. 1). This assumption addresses education problems head-on as ID theories systematically produce instructions which are tailored for specific situations and goals, rendering the adaptation of ID inside a classroom more favorable. Yet, classrooms are just part of a system in which many factors influence teachers and learners. The important element in the system is the curriculum that governs the goals, content, objectives, and more importantly, determines resources that will be made available to teachers. Therefore, if technology is to be integrated, the curriculum needs to be appropriately designed accordingly.

However, curriculum development is guided by the same queries that drive instructional design: what to teach, and how to teach and evaluate ? In fact, the similarity raises the question of whether they are the same. The answer lies in the emphasis on the questions asked, whereas curriculum designers emphasize the question of what should be learned, instructional designers place importance on how instructions should be organized for learning. Therefore, ID is more applicable, as the neglect of the actual processes that inform decisions taken in curriculum design inside the classroom, results in teachers doing a lot of improvising. All of which threaten the consistency of the teaching practice.

METHODOLOGY

The unavailability of ID-specific classrooms whether at the level of schools or universities in Algeria poses challenges in conducting a practical endeavor as it is rather infeasible to rely on surveys. Accordingly, there is a necessity to establish a context where ID principles can be incorporated within an EFL classroom. For this reason, an experiment was devised for two classrooms. The aim is to analyze and dissect learners' performance, using both the quantitative and the qualitative approaches. While laying heavy emphasis on the former through the comparison of marks obtained by tests, information collected from observation is crucial in understanding what happened, more specifically, accounting for learners' behavior and how that might have affected their performance during the courses. The current methodology section provides a detailed description of the ID method adapted, the experiment design, lesson plans, types of activities, and the analysis procedures. It should be noted that the following experiment is considered the second attempt as a similar one was conducted in 2015 as part of an unpublished master dissertation research thesis. However, a different method was selected in the current study.

The experiment design

The experiment was conducted at the Boufadi Middle School, in a rural city in the south of Algeria. Middle school is considered the second phase in the Algerian education system between primary and secondary school. It comprises four levels from 1MS to 4MS with learners aged from 11 to 14 respectively. The experiment was carried out with two classes of 4 MS - 4MS1 and 4MS2 (see Table 1). The choice of the setting comes as a result of the researcher being a permanent teacher at the school. The two groups were taught by a colleague at the same school for more credibility and to allow the researcher to pay more attention to learners' behavior and the overall teaching/ learning experience. The teacher is experienced and she is also familiar with the use of ICTs.

Table 1*: Sample Size and Distribution*

4MS1(The Treatment Group)		**4MS2 (The Control Group)**	
Males	Females	Males	Females
12	10	10	11
Total: 22		Total: 21	

The research adopts the pretest-posttest design to compare the change in performance between the control group and the treatment group. Each of the two classes received the pretest. The results from the latter were used as a baseline for comparison later with the results of the posttest. Furthermore, the pretest served as an analytical tool to provide better insight into the learners' previous knowledge of the subject they would engage with during the experiment. Learners in both classes were required to take two posttests. The reason behind multiple posttests is to assure that fluctuation in numbers reflects performance change. Such a decision was a recommendation in the previous experiment in which one posttest was delivered and some numbers were difficult to interpret.

Lesson plans

The experiment design covered one sequence unit which contains six lessons. The theme was healthy food and eating habits. The lessons adhered to the Algerian education system second-generation curriculum. The starting lesson was devised to install resources and introduce learners to the subject. It is at this level that teachers were instructed to utilize technology to concretize concepts and help learners understand key vocabulary items they will use throughout the sequence. The first session was labeled "I listen and do", thus, heavy emphasis was laid on the receptive skills (for the complete lesson plans see Table 2).

Table 2: *The Sequence Layout*

Sessions	**The General Aims**
I listen and do	Installing resources – Introducing the topic (heavy usage of ICTs)
I practice	Practice on the newly introduced subject (less ICT utilization)
Language use	Inducing grammatical rules
Posttest 1	Assessing learners' performance
I pronounce	Focusing on pronunciation in particular vocabulary items related to the theme (less ICTs utilization)
I read and do	The emphasis is on reading comprehension (Moderate use of ICTs)
I learn to integrate	Learners integrate all that they learned during the sequence in one project-like task or a situation (often no need for ICTs)
Posttest 2	Assessing learners' performance

Both groups shared the same lesson plans and procedures. However, there were differences in the adaptation of instructional design with the treatment group. In the latter, the inclusion of technology was grounded on a solid framework controlled by a dedicated design that the teacher used alongside the primary lesson plan. Translating such an endeavor into practice, the ADDIE model was utilized for the production and validation of the material deployed during the lesson (Ghani, Malim, & Daud, 2018; Jung, Kim, Lee, & Shin, 2019). ADDIE is an acronym that stands for Analysis, Design, Development, Implementation, and Evaluation, the same processes any teacher would adhere to when designing a lesson plan. However, in the case of this study, the ADDIE model was deployed explicitly for the technology itself. In the analysis, the teacher conducted a needs analysis to account for the variables involved in the learning context. The analysis phase assured that the design of the material would match the needs of the learners. In the three processes - design, development, and implementation, the designer takes into consideration the ease of use of the material. More importantly, it has to generate strong motivation that ensures that learners will be oriented. In regard to evaluation, the applications advanced were first tested with a small group of learners as part of a pilot research.

The ADDIE model was also directed by Gagné's Conditions for Learning (Gagne, 1965). The core idea of the theory lies in the detailed description of what Gagné refers to as the five domains of learning outcomes: verbal information, intellectual skills, psychomotor skills, attitudes, and cognitive strategies, all of which need to be accounted for in the design of E-learning content. Since ID theories are more oriented towards practical application, Conditions for Learning describes nine events of instructions for successful learning: gain attention, inform learners of objectives, present the content, provide learning guidance, elicit performance (practice), provide feedback, and assess performance (Driscoll, 2005, p. 364).

E-Learning content design

The primary aim of the research was to provide the context for a highly interactive E-learning experience for learners. Instead of a video presented through a projector, learners should be able to control the flow of information as an alternative to being just passive receptors. Therefore, Adobe Captivate was deemed to be an appropriate tool. The latter is an authoring tool for E-learning content creation. The reason behind opting for this particular program goes to three main advantages that it offers. First, it comprises a library of more than 25,000 characters and templates which facilitate the process of exemplifying and using realia or the objects or activities used to relate classroom teaching to real life. Second, it comes with built-in quizzes and question styles, thus, easing the process of design. Third, the ability to publish the lessons designed using different formats whether through web pages, or stand-alone applications.

In the experiment, three applications were devised to be deployed during the sessions. Each application with different tabs that represented tasks in the lesson. Learners were required to complete each task to proceed to the next one. Despite the fact that in the treatment group different procedures were adopted by the teacher, the idea was to try to follow the same lesson plan content using software. Therefore, learners had the ability to listen to audio scripts by interacting with the applications' user interface. The idea that learners have control over their lesson required multiple computers which were rather difficult to provide as there was no funding for the research. As a solution, learners worked in a group of four and each group was assigned a laptop.

Figure 1, shown below, is a screenshot of the first task taken from the learner's application side in which learners were able to play and listen to a text, provide answers, and submit them to the teacher and receive instant pre-programmed feedback. Learners could also ask for permission to see the text instead of listening. The permission was granted through another application accessible to the teacher only, from which she could monitor in real-time, the progress of learners.

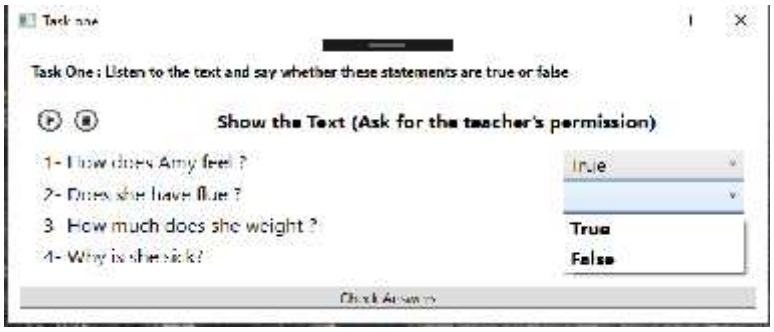

Figure 1: A Screenshot from Task One (The Treatment Group)

Data analysis procedures

Both scores of the pretest and posttest were analyzed using Microsoft Excel. The number of activities in the tests was seven. However, the regular scoring system used at schools was slightly modified to ease the process of analysis. Each activity score was calculated as a percentage. Later, the average score of all activities was calculated to obtain the average score of each learner. Scores from the pretest were used as a baseline to detect any performance variation between the control and the experimental group. Moreover, the pretest was used to spot deficiencies learners might have had.

Nevertheless, not all aspects of the experiment can be accounted for through numbers. Thus, qualitative data was necessary to describe learners' engagement, goal achievement, and how well technology was used. The latter was obtained by means of observation and informal interviews both of which were handled by the researcher who kept notes on learners' behavior as the school administration did not allow the use of any recording equipment. Regarding the informal interviews, at the end of each session, students were asked about their opinions on the lessons.

RESULTS AND ANALYSIS

The pretests

Figure 1 and Figure 2 below show the results for the pretest of both the control group and the treatment group in that order. At this stage, the low numbers charted in the pretests come as a result of the inability of learners to deal with the questions since they were not familiar with the topic as yet. The similarity in the averages and the standard deviations in the pretests is an advantage for the research that will help to arrive at a representative and accurate comparison with the posttest marks. The averages are similar hovering around 7/20 (all averages are counted out of 20) and the standard deviations around 2.5.

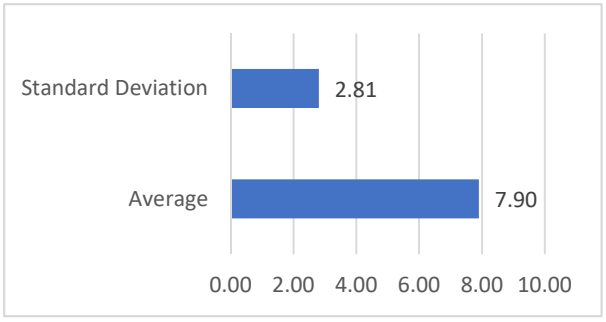

***Figure 1*:** The Pretest Results (The Control Group)

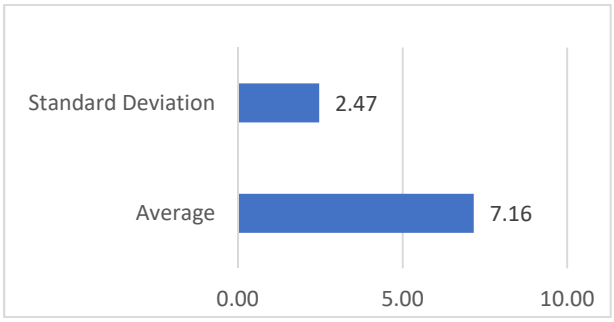

Figure 2: The Pretest Results (The Treatment Group)

The pretests- posttests results

Figure 3 and Figure 4 below show the averages and standard deviations obtained in the two groups and in the three tests. The control group scored 9.07 out of 20 in the posttest 1 and 10.93 in the second posttest. On the other hand, the average of 10.05 was registered with the treatment group in the first posttest and 10.70 in the second one. The numbers obtained show that the two classrooms have benefited from the lessons, however, the closeness of results for the two groups indicates that the treatment group did not take advantage of the technology deployed in the classroom.

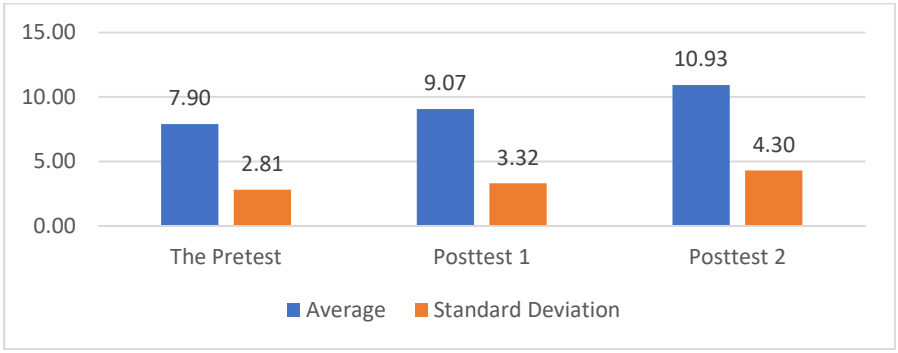

Figure 3: Pretest – Posttest Results of the Control Group (Average and Standard Deviation)

The results shown in Figure 3 and Figure 4 indicate that the standard deviation increased gradually jumping from 2.81 to 4.3 in the second posttest, thus an increase of 53 %. As far as the treatment group is concerned, the figures fluctuated and showed a decrease. Further, the standard deviation value shows that in the control group the scores are more consistent. In light of the statistics, a more detailed view of learners' scores is needed.

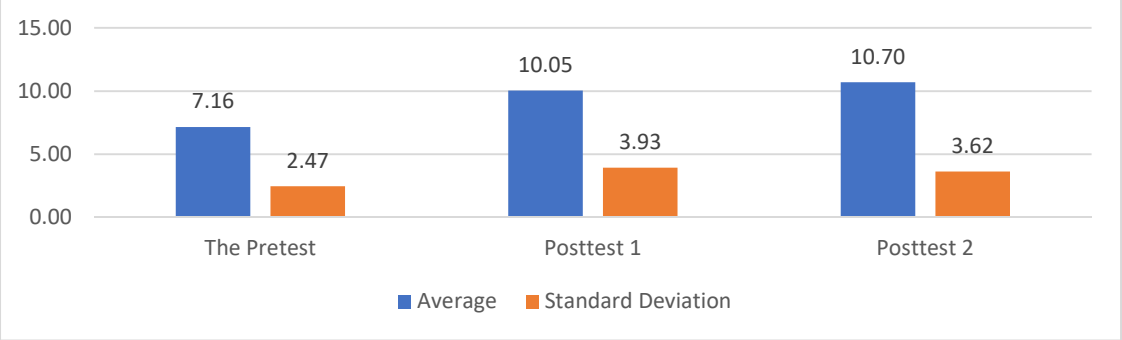

Figure 4: Pretest – Posttest Results of the Treatment Group (Average and Standard Deviation)

Figure 5 and Figure 6 below offer an in-depth analysis of the scores of the learners in all of the tests. Looking at the way lines in Figure 5 are consistent with each other, it becomes clear that learners have advanced at the same rate with those at the top staying ahead. For instance, the spikes recorded for learners 4, 8, 12, 14, and 18 remain the same. The picture changes with Figure 6 as the grey line reveals that learners' scores are more stable and values are relatively close in the second posttest. For example, learners 4,5,6,7, and 17 showed substantial improvement from the pretest. All in all, from pure quantitative analysis, the experiment yields the conclusion that the adaptation of technology did not result in the intended outcomes.

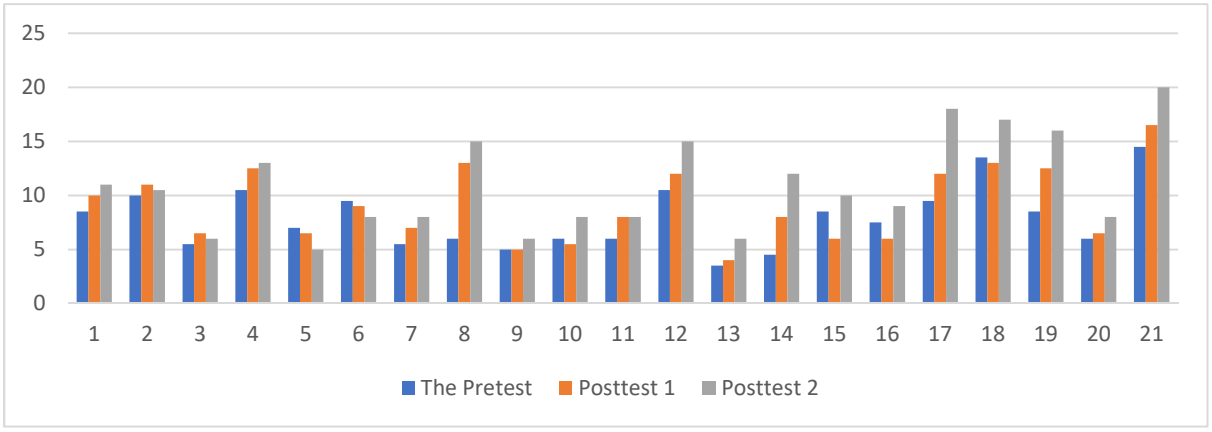

Figure 5: The Control Group Learners' scores (21 learners)

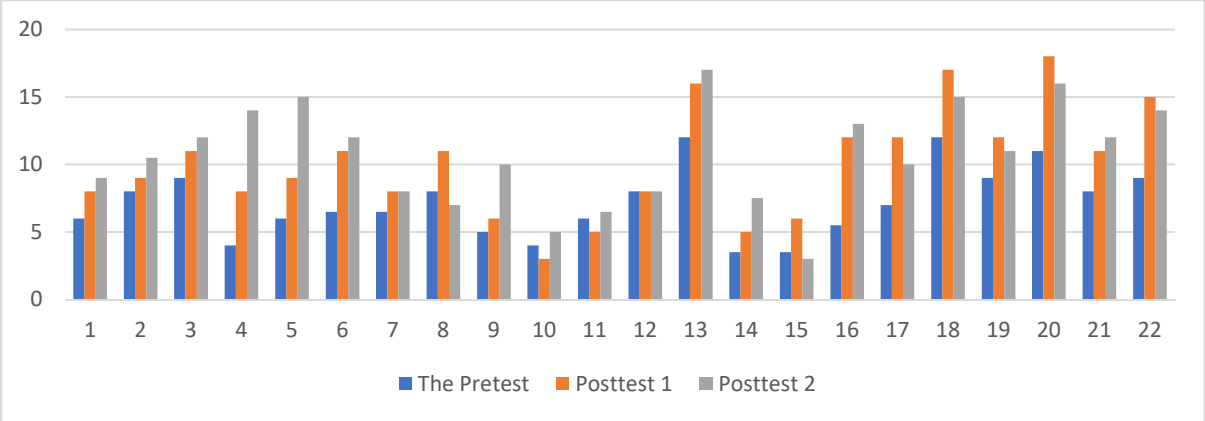

Figure 6: The Treatment Group Learners' scores (22 learners)

DISCUSSION

Learners' participation and engagement

The Algerian second-generation curriculum emphasizes the use of communicative approaches in language teaching. However, the realization of such an approach inside the classrooms require learners to be fully engaged in interesting topics, or at least remain oriented. The teacher in charge of delivering the lessons to the two groups stated that the noticeable difference between the two classrooms is seen in learners' participation and engagement. The latter was also confirmed through the observation of the interaction between the teacher and the learners. In the control group, communications were mostly established with fast learners, while leaving slow ones behind. As the gap between the two types of learners becomes bigger, the more complex the task of the teacher gets. The result is seen in Figure 5, where there is more variation in the marks.

With the treatment group, it was comparatively easy since most, or all of, the learners were more engaged with the lessons. The ability to control the progress of the lesson and the flow of information by each group meant less dependency on the teacher's instructions and help. In fact, learners in each group inside the classroom offered assistance to each other, a behavior that often teachers find so difficult to elicit. Accordingly, the role of the teacher changed with respect to learners. Instead of dedicating time to explaining instructions and then allocating effort to help those who did not understand, the teacher was simply directing and guiding. It was also clear that managing such a class was less stressful for both teachers and learners. However, the compelling question is why these positive changes in the class were not reflected in the final scores?

In an effort to address this query, learners in the treatment group were told about the results of the experiment and its failure from the perspective of numbers. They agreed that while technology has transformed the classroom into a motivating place in which all felt happy working together and collaborating, the nature of each test itself was a hindering factor. Learners in the control group were independent and self-reliant in most steps of the lessons. Thus, they did not encounter major problems when taking the tests, during which each learner needed to rely on him/ herself. On the contrary, participants in the treatment group learned to work together to solve problems becoming more dependent on each other. The repercussions are seen in particular with slow learners who struggled to perform in the same way as they did when they worked in a group.

Instructional design to implement technology in EFL classrooms

The gist of the research lies in the adaptation of ID to integrate technology in traditional EFL classrooms. Three criteria have to be considered in assessing the success of this endeavor, effectiveness, efficiency, and generalizability. From a purely quantitative standpoint, the adaptation of ID principles in the implementation of technology inside an EFL classroom has failed to meet the intended or the desirable outcome. Simply, there was no meaningful increase in the averages of the treatment group learners. In fact, the figures showed exactly the opposite of the control group learners who obtained higher scores. The closeness of the numbers in the treatment group can be considered as a positive point for the use of ID principles, however, the low numbers scores hardly allow any solid conclusion to be advanced.

However, taking a qualitative perspective, the careful arrangement of technology inside the classroom through the implementation of ID as a theoretical framework transforms the classroom into a lively workshop where learners are engaged with the lessons. Learners are no longer dependent on the teacher to control the lesson and the flow of knowledge. The teacher, on the other hand, does not waste valuable effort and time trying to bring slow learners to the level of their fast counterparts. Instead, most learners advance at the same pace and the result is a homogenous classroom. Nevertheless, the nature of present-day tests which are self-reliant does not help in reflecting collaborative learning. A reason that is most likely behind the low scores observed.

It was difficult to achieve efficiency with the adaptation of technology inside an EFL classroom. As even a small-scale experiment such as the one conducted required five laptops, a router, and long cables to establish a small network. Thus, specialized equipment is needed that entails both financial and technical support. Furthermore, such materials have to be integrated into a classroom since the time allocated for installation would be longer than the session itself. Generalizability is related to efficiency, in that the difficulty with installation of equipment inside the classroom and the lack of expertise in this domain by teachers, are factors that hinder the ability to generalize this endeavor. Moreover, the reliance on custom-made software is perhaps the greatest deterrent, which raises a question of who should design these kinds of applications.

Teachers as instructional designers

The researcher used Adobe Captivate to design and deploy an application that rendered regular lesson plan activities into an interactive experience. In the context of the research, the application needed five hours to be fully functional and about two for testing and debugging. Therefore, seven hours were assigned for what can be deemed as a simple program. This time would have been considerably more costly if the application was developed by a programmer, raising the question of whether a teacher can design these applications.

When one reads about Adobe Captivate one will often get the impression that anyone is able to design using such applications, however, this software remains commercial (Bruyndonckx, 2012). Even if we to assume that what they claim is true, building an application necessitates time and effort, two elements teachers already have in limited supply. Consequently, a dedicated instructional designer has to be assigned to the task of translating the lesson plans. There is no question that for effectiveness, it would be beneficial if teachers supervise those designers. After all, a designer's main task is to translate the vision of those who are using the end-product.

CONCLUSION

The current research started with the assumption that technology needs to be implemented based on a solid and dedicated theoretical framework to yield the desired outcomes. Regarding the latter,

there is no question that instructional design theories offer clear guidelines that can help practitioners to integrate technology inside the classroom. Being application-oriented, ID principles help to address the issues teachers face when trying to use assistive technology. The experiment conducted showed that detailed implementation of ID principles transformed the class into an active workshop where all learners were engaged with activities. More importantly, the use of applications that are designed around what teachers usually teach in a regular classroom, helps teachers to be more efficient.

However, failing to arrive at satisfactory scores in this study raises the question of whether this endeavor is even worthy. Bearing in mind that efficiency and generalizability are two criteria that make these kinds of attempts often very difficult to conceive, it is difficult to conclude with a positive response. However, the idea the research is advancing is that maximum productivity on every aspect of a lesson inside a classroom needs to be grounded on valid theories, especially since teachers are increasingly being asked to implement ICTs in their classrooms.

Nevertheless, the amount of work teachers are asked to do even before coming to a class is considerable as they are required not only to plan lessons but also to design the use of the equipment and align their use with the lesson‘s objectives. Now, asking teachers to adhere to ID principles when using technology can be problematic since that would add a huge workload further complicating the matter. Consequently, teachers and instructional designers should work hand-in-hand with the latter being in charge of designing tools providing teachers with what can be considered as blueprints for lesson plans. Then, it is the teachers' responsibility to turn them into learning experiences.

RECOMMENDATIONS FOR FUTURE RESEARCH

In light of the research results, the following recommendations are provided for consideration:

1. A similar experiment can make use of blended-learning models since it is easier to deploy the same application via the Internet.
2. More class time should be devoted to the sessions.
3. An experienced instructional designer should be assigned to complete the required tasks.

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