

THE GEORGE
WASHINGTON
UNIVERSITY
WASHINGTON, DC

MEASURING THE EFFECTIVENESS OF
EDUCATIONAL TECHNOLOGY

BY

FATEMA AKBAR MOHAMMED ALI WIHDAT

THE GEORGE WASHINGTON UNIVERSITY

DECEMBER 2015

MANAMA, KINGDOM OF BAHRAIN

MEASURING THE EFFECTIVENESS OF EDUCATIONAL TECHNOLOGY

BY

FATEMA AKBAR MOHAMMED ALI WIHDAT

THE GEORGE WASHINGTON UNIVERSITY

DECEMBER 2015

A RESEARCH REPORT IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE DEGREE OF MASTER OF ENGINEERING
MANAGEMENT, SCHOOL OF ENGINEERING AND APPLIED SCIENCE,
THE GEORGE WASHINGTON UNIVERSITY

MANAMA, KINGDOM OF BAHRAIN

'People are either scholars or learners, everyone else are mobs'

'Loss of a beloved is exile'

Imam Ali A.S

To my beloved father-in-law

R.I.P

ACKNOWLEDGEMENTS

Thank you Allah Almighty for all of life's gifts. I would like to take this opportunity to thank my supervisor Dr. Mahmood Alalawi on his continuous support. I would also like to thank my parents, my mother-in-law and husband for their efforts and encouragement.

TABLE OF CONTENTS

Acknowledgements	iii
List of Tables	v
List of Figures	vi
List of Abbreviations	vii
Abstract	viii
Chapter 1. Introduction	1
1.1 Background of the study	1-2
1.2 Statement of the problem	3
1.3 Purpose of the study	3
1.4 Research questions	3
1.5 Research objectives	4
1.6 Significance of the study	4
Chapter 2. Literature Review	5
2.1 Educational technology	5-9
2.2 Educational technology and technology literacy	9-10
2.3 Language acquisition	11
2.4 Educational technology and language acquisition	11-12
2.5 Engineering Management	14
Chapter 3. Research Design and Methodology	20
3.1 Research methods time table	20
3.2 Hypothesis	21
3.3 Data collection methods: Surveys	22-27
3.4 The experiment	27-28
Chapter 4. Discussion of results and finding	29
4.1 Discussions and findings from observations	29-30
4.2 Results of the quasi-experiment	30-31
4.3 Hypothesis findings and survey results	31-43

Chapter 5. Discussions, recommendations and conclusion	44
5.1 Conclusion and discussions	44-46
4.2 Limitations of the study and suggestions	47
Appendix A: Students' survey	48-50
Appendix B: Teachers' survey	51-54
References	55-59

LIST OF FIGURES

Figure 2- 1: System Development Life Cycle (SDLC)	15
Figure 2-2: Components of the literature review	19

LIST OF TABLES

Table 3-1: Research methodologies time table	20
Table 4-1: Quasi experiments' test results	29
Table 4-2: T-test: Two-Sample Assuming Unequal Variances	30
Table 4-3: Descriptive statistics	39
Table 4-4: Correlations of surveys' data	41

LIST OF ABBREVIATIONS

ET	Educational technology
SDLC	System development life cycle
EFL	English as a foreign language
CEO	Chief Executive Officer
ACEC	The American Cultural and Educational Center
CAI	Computer Assisted Instruction
SPSS	Statistical Package for the Social Sciences
ESL	English as a second language
PC	Personal Computer
ICT	Information and Communication Technologies
TPACK	Technological Pedagogical Content Knowledge
EM	Engineering Management

ABSTRACT

This research sought to explore the importance of ET to teachers and learners within the context of language learning. The research used both qualitative and quantitative research methods to collect and analyze both primary and secondary data. Preliminary research was done by ways of conducting a test to ESL students. The test was aimed to compare a mean of ET vs. the traditional way. Research Self-administered surveys to students as well as classroom observation were used to gather primary data. Secondary data was gathered by way of reviewing documents from previous studies. Survey Monkey analysis was used for quantitative data while meaning condensation and meaning categorization were used for qualitative data analysis. .

Reviews of literature showed a lot of gaps in ET research especially on its importance on language learning. Preliminary research has shown that using online methods for language learning is more efficient, effective and less time consuming. However, education technology does not come error free. There is a need for proper research before incorporating ET into an educational institution's curriculum. Since most schools already use technology informally and perhaps unknowingly. Research has to be conducted and a need for a new role is present. Educational institutions might want to consider higher educational engineers in order to design the ET curriculum based on the institutions' needs.

Surveys showed that both educators and students see the importance of incorporating technology into learning. The test experiment showed that using technology aids in reduction of time and better comprehension of information and tasks. Also, this researched proved significant results of using ET on students' test results.

The aim of this research is to form a ground for inventing a reliable mobile application for learning languages which the researcher couldn't do due to finance and time limitations.

CHAPTER 1

INTRODUCTION

This chapter provides an introduction to the research. It also lists the objectives of the study, the research problem, questions and the significance of this study.

1.1 Background of the study

Technology is advancing rapidly which has significantly changed the people learn, work, connect and invest energy. Data and PC advances have noticeably upset about each part of day by day life—the way people get their news, the way arrange merchandise and administrations. Furthermore, the ways people convey. The fact that technology is ought to likewise aid in leading approaches aimed to enhance learning/teaching in schools is sensible and expected. Moreover, trusting the capacity to fuse the instructive open doors that technology guarantees will help level the fields all through school phases, instruction—especially crosswise over racial, sexual orientation, and geographic partitions. Technology offers better approaches for learning/teaching. It also provides new methods to all parties that are included in the educational field to be transparently responsible towards individuals, groups, furthermore, students. (National Research Council D. Ellmore, 1995)

Technology is often associated with the discovery of computers or electricity. However, the researcher believes that technology is an act of innovation and it started with the early man when he transformed rocks into tools for hunting. Technology is anything and everything that aids in making life easier for the human being.

Technology has drastically modified the exterior of the instructive scene along with the development of learning apparatuses and electronic flashcards. From digging the Web just for data, to taking part in reproduced encounters, ET has been progressively arranged

as the driving power in learning. As people keep on incorporating technology into showing practice, people battle with comprehending the genuine estimation of these different modalities of media in learning. ET has become a fairly nonspecific terminology which represents both procedure and the study which technology may be used to prompt learning.

Research proposes that advancements both new or developing can possibly lead to the enhancement of the new information in numerous energizing routes and to the upgrade in learning by allowing access to an unfathomable exhibit of data and associations with other individuals—for data, criticism, and motivation (J. Bransford, 1999). On the other hand, there is changed proof with respect to the adequacy of technology as it identifies with instructive value and accomplishment problems. (Barton, 2001) Shouts for experimental research to be conducted in classroom and schools that are intended to figure out the types of employments of technology which are most successful with which students and under which conditions. (Barton, 2001) (Education, 2001)

Education is delivered through means of communication. Languages the most effective tool of communication. Not only spoken by mankind but all species have their own language or their own mean of communication through sounds or signals. Engineers communicate with computers in a language that computers understand. Thus, system engineers learn computer languages such as C++. Therefore, writing this as an Engineering student and a language teacher was inevitable due to its perceived importance.

The author of this research; already a polyglot had a very successful trial learning Italian with the use of technologies. Despite the not being fluent yet, a degree of fluency was achieved especially with accurate pronunciation. It is hard to determine which technologies to use or whether some can even be relied on as many on the market are designed by amateurs seeking profits.

1.1 The research problem

Technologies are making their ways into our educational institutions; there are schools in Bahrain with smart boards and advanced technologies. Educational technologies have become a trend that is costly to buy and maintain. There is minimal research conducted on this topic and most researches do not cover the latest trends such as mobile applications and game based learning. Also, traditional teachers might be technology illiterate therefore resistant to incorporating ET.

1.2 The purpose of the study

To examine the importance of technology as an instructional and learning tool. Also, to make recommendations that could help ministry officials and stake holders in deciding whether to incorporate ET in their institutions. It will also aim to help analyze the subject for engineering a mobile application for language learning.

1.3 Research objective

- To examine the importance of ET to language teachers and learners.
- To test and evaluate one of the ET tools and make recommendations for improvement.
- To provide helpful data and particular proposals about assessing the adequacy of innovative applications actualized to improve instructing, learning, and accomplishment.

1.4 The research questions

1. Can educational technologies enhance the learning outcome through specific and complete cycle of teaching-learning process?
2. What is the importance of ET to language learners and teachers?

1.5 Significance of the study

This study is crucial due to the emergence of technology based schools in Bahrain. This study is feasible because it's mostly a theoretical study. This study will make a contribution to the body of knowledge and create a starting ground for further researches with the possibility of testing the theories on schools. Unfortunately, due to time and resources constraints, the research could not be tested on school systems in Bahrain. Also, this research was meant to be done to engineer a special English learning mobile application for Native Arabic speakers. However, this could not be done due to time and finances constraints.

This study is also important for EM as an engineering manager must be diverse and needs the knowledge to engineer or manage various industries. One cannot underestimate the importance of the education industry as without it none of the technological advances would be possible. The world would not be the same without education.

CHAPTER 2

LITERATURE REVIEW

This chapter discusses previous researches conducted on relevant topics. The chapter consists of three main sections. The first section examines literature review of ET. This section discusses four topics; Educational technology, Educational technology and technological literacy, language acquisition, Educational technology and language acquisition. The second section of the literature review discusses EM with a sub-section about system development life cycle. The last section discusses EM within the technological educational field and evaluation of ET.

2.1 Educational technology

It is doubtful to find schools without some form of technology in developed countries. Even if the school does not officially run an ET curriculum. Technology is still used in the form of computers, hardware, software, CD players and projectors. For instance, this research would not have been possible without the use of computers, Microsoft word software and the internet of course. ET is a wide field of technology which includes gadgets, hardware, machines, devices, instrument and tools used to promote teaching and learning (Umeh, 2008). (Umeh, 2008) noted that a school that has TV, radio, movies, slide projectors, sound and feature recorders, PCs, and so forth, may be said to have high

ET contents that advance quality education. ET can likewise be seen as software which underscores cautious configuration of the educating-learning procedure, utilizing standards of behavioral sciences, likewise precise use of individuals, thoughts, materials and hardware to understand educational problems.

ET isn't confined to high technology. Nonetheless, electronic instructive technology, also called e-learning, has become a vital piece of society today, containing a wide exhibit of

digitization methodologies, segments and conveyance methods. (Selwyn, 2011) for instance, e-learning stresses versatility, however can be generally vague on a basic fundamental level from instructive/ET. (Moore, Dickson-Deane, & Galyen, 2011)

ET consists of various sorts of media that convey content, sound, pictures, animation, and streaming videos, and incorporates technology procedures and applications, for example, sound or feature tape, CD ROM, satellite television, and PC based learning, and also nearby intranet/extranet and electronic learning. Data and correspondence frameworks, whether unsupported or in light of either neighborhood systems or the Internet in arranged learning, underlie numerous e-learning processes. (Tavangarian D., 2004)

(Scardamalia, 2006) Depicts three unmistakable regions of technologies which have possible ramifications for adding to profundity of comprehension. These comprise of the below:

1. "(CAI) Computer- assisted or aided instruction"
2. "Games, stimulations and research facility tools; and"
3. "Technology to aid discourse"

Specifically, utilization "CAI" for supplementing old-fashioned instructing has ultimately turned into a typical element of ancillary training. But, level of which contemporary employments of technology backed direction add to profound comprehension turned out in many cases to demonstrate tough to compute (Scardamalia, 2006).

There has been some instructive exploration inspecting the effect of fusing different media modalities into educational program. Specifically, (Mayer, 1999) has added to setting up a subjective hypothesis of sight and sound realizing, which heaps of how people learn. Firstly, (Mayer, 1999) declares (paivio, 1986)of double coding, one that hypothesizes people have separate channels for handling visual and sound-related data. Furthermore, (Mayer, 1999) takes note of that people have a restricted limit for the measure of data that every passage could do at one time.

Finally, (Mayer, 1999) attests that people absorb by dynamic appointment with subjective procedures, for example, the determination, association and reconciliation of data ("tactile memory", "working memory", and "long haul memory").

(Mayer, 1999)'s subjective hypothesis regarding "interactive media learning locations" both the qualities and restrictions of human observation and discernment is firmly connected to John (Sweller J. , 1988)'s intellectual burden hypothesis. (Sweller J. , 1988) Portrays the confinements of working memory and devises instructional procedures to encourage the obtaining of learning in long haul memory.

"Cognitive load theory" presents a structure for teaching strategy via differentiating between three types of "cognitive load" ("intrinsic", "extraneous", and "germane") and their relationship with knowledge.

(Sweller J. a., 1994) depicted this theory as emerging commencing the cooperation amid the skill of the pupil and learning materials. "Extraneous load" is the "cognitive load" that goes beyond the "germane", and "intrinsic cognitive load" is the one keen to processes associated with the building and mechanization of "schemas" (Sweller J. V., 1998)

ET means effective employment of technological strategies in learning. As an idea, it concerns a variety of contraptions, for example, media, machines and systems administration equipment, and also considering fundamental hypothetical points of view for their powerful application. (Richey, 2008; Anderson, 2003)

Hypothetical viewpoints and experimental testing impact instructional outline. The utilization of hypotheses of human conduct to ET gets info from "instructional hypothesis", "learning hypothesis", "educational psychology", "media psychology" and "human performance technology".

ET and "e-learning" can happen within or outside the school. ET could act a natural pace, nonparallel learning. It could also be educator driven, nonparallel learning. It's well-

matched to "distance learning" and in coincidence with up close and personal teaching, which is termed "blended learning".

Numerous private institutions have made the Internet their principle educational environment. Today, learners have the choice of completely depending on the Internet for their education. The appearance of virtual colleges has made it workable for grown-up learners anyplace on the planet to acquire legitimate degrees from courses tackled the Internet.

Grown-up learners are tricked by the likelihood of getting their degree from the solace of their home. Whether it is to have the capacity to watch over their kids or keep up their full-time work, the adaptability that is made conceivable by online courses may assume a critical part in an imminent learner's choice to seek after a degree. In spite of the numerous guarantees of a speedy degree without expecting to leave their family or set aside a few minutes particular responsibilities, forthcoming learners need to apply alert in picking an establishment. Pretty much as data found on the Internet is not so much legitimate, the organizations recovered through a general pursuit may not be respectable. At the point when associations decide to utilize the Internet as an instructive device, their endeavors ought to go past transferring perusing material onto a site. Teachers must take after the configuration most suitable for learners and the current point. Moreover, on account of advanced education, learners need to have admittance to supplementary yet vital assets, for example, a library, directing administrations and specialized backing. While numerous foundations have been pioneers in this particular area, others have predestined these needs and just offer data under the heading of instruction.

When all is said in done, the nature of education in an online setting is by all accounts debilitated and numerous individuals won't endure it. In today's universe of snappy fixes and band-help arrangements, it is not shocking that grown-ups worldwide can and do succumb to these tricks. Furthermore, if not these offers are direct tricks, numerous may be basically disillusioning. There are instances of foundations who depend on teachers to make their courses accessible online while never furnishing them with the important

preparing to do as such. This outcomes in inadequately planned courses that offer no backing to their students. Quality in the conveyance of instruction is not a given, nor if it be bargained for the purpose of accommodation. Pioneers in instructive innovation have invested years contemplating the learner and surveying the learner's necessities. Instructional plans are created and utilized to offer quality training. At the point when appropriately directed, online courses can offer guideline of equivalent or preferred quality over direction offered through more customary routines.

The nature of web learning has the capability of being as sufficient and productive as up close and personal instruction. Numerous ranges in regards to the nature of instruction can bring about concern, yet they can likewise be managed and the experts in the field are very much prepared to verify that. The best procedure is to prepare teachers and staff and make them comprehend the ramifications of offering online courses. Additionally, what has been named 'mixed training', an instructive domain that depends on both up close and personal gatherings and online exercises, appears to join the best of both circumstances. Maybe traditional colleges ought to be less hesitant to embrace new technologies and gift their students more autonomy and control over their own advancement. In the meantime, virtual colleges could urge to meet in individual when appropriate and set up projects with nearby colleges allowing their students to profit by directed work.

2.2 Educational technology and technology literacy

Despite the common belief that learning is improved through the utilization of technology (Education, 2001) mentioned that people do not have a typical comprehension of the meaning of technology. For some, technology became synonymous with "PC gear", "programming", and "electronic gadgets". "Technology mix" means utilizing this gear as a part of the classroom. Be that as it may, this definition is somewhat tight. ET incorporates any tools, gadgets or equipment – "mechanical or electronic"- which could be utilized to assist pupils with finishing determined education objectives (Davies, 2008). Explanations behind utilizing educational technologies may incorporate sparing time or progressing the adequacy of students' learning efforts. Still, the clueless or aimless

utilization of technology, paying little mind to quantity, might truth be told be proof of an absence of what (Mishra, 2006) calls "TPACK".

"Technology literacy" has been characterized in distinctive ways utilizing various labels. "Computer literacy", often utilized synonymous with "technology literacy", refers to the information also, capacity a man needs to utilize PCs (McMillan, 1996) or to the solace level somebody has with utilizing PC programs and different applications connected with PCs.

Essentially, the meaning of "information and communication technology literacy" concentrates on the capacity to assemble, sort out, investigate, and report data utilizing technology (Leu D. J., 2000). These terms concentrate on particular parts of technology literacy what's more, have an educational context; on the other hand, the definition utilized for this article concentrates on a more extensive point of view of "ET literacy". (Hansen, 2003) Has characterized "technology literacy" as "an individual's capacities to adopt, adapt, invent, and assess technology to absolutely influence his or her life, community, and environment". (Eisenberg, 2002) recommended that an technologically literate individual can "utilize technology as a tool for association, correspondence, research, and critical thinking" (p. 1). Without a doubt, creating "technology literacy" and applying it within a schoolroom circumstance likely includes an unpredictable collaboration of "epistemic and pedagogical convictions", "intrapersonal variables", "social components", and affordances of the earth (Ertmer, 2005) (Leu D. , 2006) (Richardson, 1996). "Technology literacy" in educational circumstances is characterized as the capacity to successfully utilize technology (i.e., any device, bit of hardware or gadget, "electronic" then again "mechanical") to finish obliged educational responsibilities. "Technology literate individuals" understand the capability of a bespoke technology, they find themselves capable to utilize such technologies efficiently, and they make choices between the technologies to utilize what's more, when to utilize it.

2.3 Language acquisition

Language learning is natural. Human beings are all born with the ability to learn a language. Humans are the only known species to date with the cognition of language. The ability of learning a language is a remarkable thing. Researchers have found evidence of young children mastering this skill which is very complex considering vocabulary, pronunciation and grammar. And, no matter what language children's guardians speak everyone learns languages the same way through some fundamental stages.

The earliest scientific explanation was done by one of the pioneers of behaviorism; (Skinner, 1957). He had provided arguments that children acquire languages based on the behavioral reinforcement principles. In simple words, children learn by connecting words with meanings. For instance, when a child says "food" and the child's mother gives him/her some food. The child will find this rewarding. (Skinner, 1957)

2.4 Educational technology and language acquisition

In the old days, physical flash cards or realia were used to teach children nouns or verbs of a particular language. Nowadays, with the evolution of technology those flash cards have become electronic.

There have been mixed reviews and research outcomes regarding the use of technology for language development. Some have said that technology destroys languages and children's' abilities to learn them. Others have said that technology aids in language learning and development.

Societal changes and global access to data have expanded the significance of utilizing technology as a tool for thinking, learning and as a method for communication for discipline-specific means.

There is a vast collection of research that backs up the advantages of technology for acquiring languages (O'Hara, 2006; O'Hara, 2009) (Cummins, 2005; Zhao Y. B., 2001). Many studies exhibit pupils who acquire in current "multimedia" , "hypertext situations" display a more increase in language development zones than pupils who acquire in traditional or conventional environments "(Ayersman, 1996; Higgins, 1992; Charney, 1994)".

Studies exploring the effect of students' development of hypermedia situations on language improvement arrived at comparable conclusions. (Nikolova, 2002)

In a review of studies that concentrated on technology's effect on the acquisition of languages, (Zhao Y. , 2005)inspected studies that inquired about the utilization of digital/computerized multimedia and language. (Zhao Y. , 2005) inferred that technology can be utilized to improve the acquisition of a language securing in the below ways:

1. "Improving access proficiency through "digital media". "Multimedia presentations (pictures, video, sound, content)" can make more grounded memory joins than text or content alone. Likewise, digital technologies permit playbacks instantly. All of which furnish the learner with brisk and simple access to distinctive areas of instructional materials. This is more than when they are utilizing a text book."
2. "Improving realness utilizing "video" and "the Internet". "The Internet" gives learners access to legitimate resources, similar to writing and news, while video can offer connection rich semantic and socially pertinent materials to learners."
3. "Improving comprehension through learner control and mixed media annotations. Video materials online can be improved with full captions, decisive word subtitles, and slowing down speech, permitting the pursuer to all the more effectively process the information. Digitized reading materials can be hyperlinked to distinctive media, which students can decide to help their comprehension of the material".
4. "Giving authentic and meaningful correspondence opportunities. Students can take part in authentic sorts of communication through "electronic mail, chat rooms, and other digitized means"".

2.5 Engineering Management

EM is a multidisciplinary field that involves the application of engineering methods and technologies to business practices EM deals with many fields. Since this research is for the Master's degree in EM with a focus in technology. Writing about ET was inevitable. That is due to beliefs and theories about the effectiveness of ET.

.In the researcher's point of view, educational engineering appears to be the missing component in the acknowledgment of numerous key innovations in education. The impulse of teachers to observe ritual is not yet adjusted by those prepared to utilize a procedure for development and convert research into functional applications.

An Engineering manager should be able to manage technical enterprises and educational institutions are becoming state of the art technical institutions. In the researcher's point of view, there is now a need for an ET engineer. The engineer must be able to engineer classroom technologies according to the needs of the educational institutions.

System/Software development life cycle

One of the main aims of researching this topic was to engineer a mobile application for language learning. However, due to time and finances constraints the same was not possible. Engineering the applications is a recommendation of the author and one of the future plans. Therefore, there was a need to research the topic and a system's development life cycle.

One of the examples of "System or software development life cycle (SDLC) model" is the waterfall modal. The name comes from the method it falls down. The model represents; a visual aspect influences individuals' perceptions of what "SDLC" does and thus how it is implanted. The earliest research describing waterfall was "Managing the development of large software system" This was published by "Dr. Winston W.Royce" in "1970". But, back then didn't name it "The waterfall modal". "Dr Winston" criticized implementing it a lot as it was still naïve. He was advocating the concepts of a serial of the development stages and vigorously repeating back to its previous stages as more evidence unfolded during the development. (Royce, 1970)

The first stage of the "SDLC" was the decision to make a mobile application. The researcher went on and created a business case for the application. The research stopped at the decision stage and could not proceed to the next stage due to the limitations of time and finance.

The researcher went on to research the market and created a business case with the "use requirements". The researcher intended to create a mobile application that would work on "Apple" and "Android" devices. However, mobile engineers said that a license for "Apple" would take too long and could not be finished within the required time limit.

Therefore, "Android" became the only option. The researcher started to look for App designers. Unfortunately, all of the approached reliable designers asked for a charge that was beyond the researcher's budget.

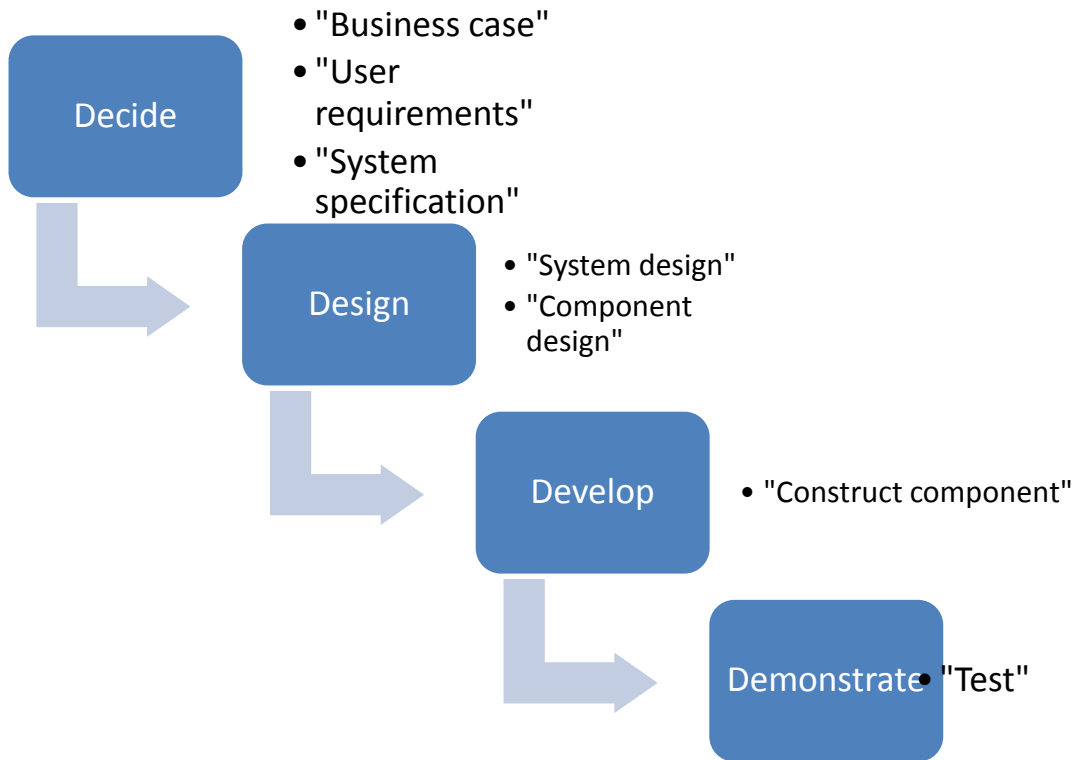


Figure 2 - 1: Royce's Modified System Development Life Cycle (SDLC)

1.3 Evaluating Educational technology

The effectiveness of ET is the point of a much heated debate. In the course of the most recent decade billions of dollars have been put resources into this field. In the United States alone, spending on education technology is expected to exceed \$56 billion yearly by 2012 (Abdel-Salam, 2006). In Canada in 2006 ninety-four percent of understudies reviewed reported utilizing a PC consistently or frequently amid the week at home, while forty-seven percent reported that they utilized the PC consistently or regularly amid the week at school (Ascough, 2007).

Student accomplishment is regularly interceded by the procedures educators utilize to merge technology into their teaching. Technology could be utilized for practice and drilling pronunciation; Technology could be utilized to encourage analytical, lateral and critical thinking abilities. Also, real-world problem solving. Technology in educational institutions could be utilized as a part of the ways grown-ups utilize technology to fulfill their jobs/work duties, analyze and sort out data/information. Furthermore, conduct research and communication. (Rockman, 2000)

The capability of educators to encourage these alterations relies on training which demonstrates industry standards to them in order to incorporate innovation into context specific instructional routines. (Heinecke W. F.)

(Cuban, 2001) Underlines a systematic tactic to evaluate technological applications that includes:

- Identifying educational needs.
- Specifying Implementation objectives..
- Instructional methods designing to make effective and efficient learning environments.

Even though decisions regarding the adequacy of technology on accomplishments are varied. Several trust that deficiency is not with the technological based developments. However, along instruments and plans of evaluation. Many schools are yet to build their frameworks for evaluating the effectiveness of ET.

(Penuel, 1999) Suggests that evaluating committees must give attention to local program contents. Evaluators should start by looking at the particular outline of the program elaborating how interventions are relied upon to cause specific alterations in learning and teaching. They prompt that foreseen alterations have to be described in specific details to shareholders to be informed when desired alterations have been accomplished. Moreover, evaluators need to take into consideration various aspects, for example, extent of evaluation, who the partners and shareholders are, the sorts of information that are required, and ways the information will be utilized. There is frequently no reliable set of particular educational modules affiliated objectives and targets aimed at the deployment of technology in teaching and learning.

Taking into consideration the shifting demographics of societies, it's essential to know the ways students from various backgrounds gain meaning and reach to fresh comprehensions via the utilization of laptops. Community relations in the class and the sociocultural parts of institute environment likewise influence outcomes of ET. (Zhao Y. B., 2001)

Family, class culture and society are vital components of the students' influences circle; the society forms consequent results and framework of technology use (Peled, 1994). Evaluators ought to try to comprehend the components of technology execution. Moreover, the probable sway on the "ecological" and "social composition" of a teaching space.

Appraisal ought to clasp the impacts associated with utilizing technology. The impacts may be at organizational or individual levels. In some cases, even group levels. This kind of evaluation may be founded on an arrangement of education scales. Also, further fresh

methods for appraisals that take into consideration the conditions of assessments. (McNabb, 1999)

The assessment ought to rely on upon the learning requirements, objectives, situation, technological solicitation, and anticipated results. (Milone, 1996; Russell, 2001; Rossi, 1999) Propose that each assessment be customized to the specific purposes and situations of a bespoke program in order to fit for compliant reliable and valuable replies to particular pending inquiries while being adequately functional to execute using accessible assets. (Milone, 1996; Russell, 2001; Rossi, 1999)

Generally speaking, the more closely the results ration is to real students' performances, the more sure assessors could be regarding the effect of the learning program, counting educational uses, on such performance. (Kennedy, 1999)

Relying on the objectives and instructional needs of the program, ones that are fixed regularly to particular programs or supported activities, results may incorporate alterations in finished homework assignments or disciplinary referrals.

Longstanding , shifts in exam results and different performance measures, an increase in school participation, an increase in occupation offers, measures of higher-order and later thinking aptitudes, and social skills may be incorporated. Different measures may be judged for implementation advantages, motivation, demeanor towards learning, engagement levels and self-esteem. Furthermore, retention of information. (Fouts, 2000; Heinecke W. F., 1999; Silvin-Kachala, 2000; Ungerleider, 2002)

Eventually, evaluation plans ought to reflect convictions by what method technology suits the model of teaching, in what way it's used to enhance learning. Thus, in what means it escalates student stimulus, accomplishment, and benefit in education. Moreover, evaluation strategies could incorporate exertions to focus upgraded proficiency and budget efficacy. Furthermore, analyze if technology accomplishes better outcomes at less expenses. (Russell, 2001)

Sufficient assessment can assist in enhancing existing innovation packages in order for them to advance to encounter student and instructor desires. Moreover, work to maintain numerous ranks of learning, also anticipate advancements. The below is a figure to summarize the components of the literature review.

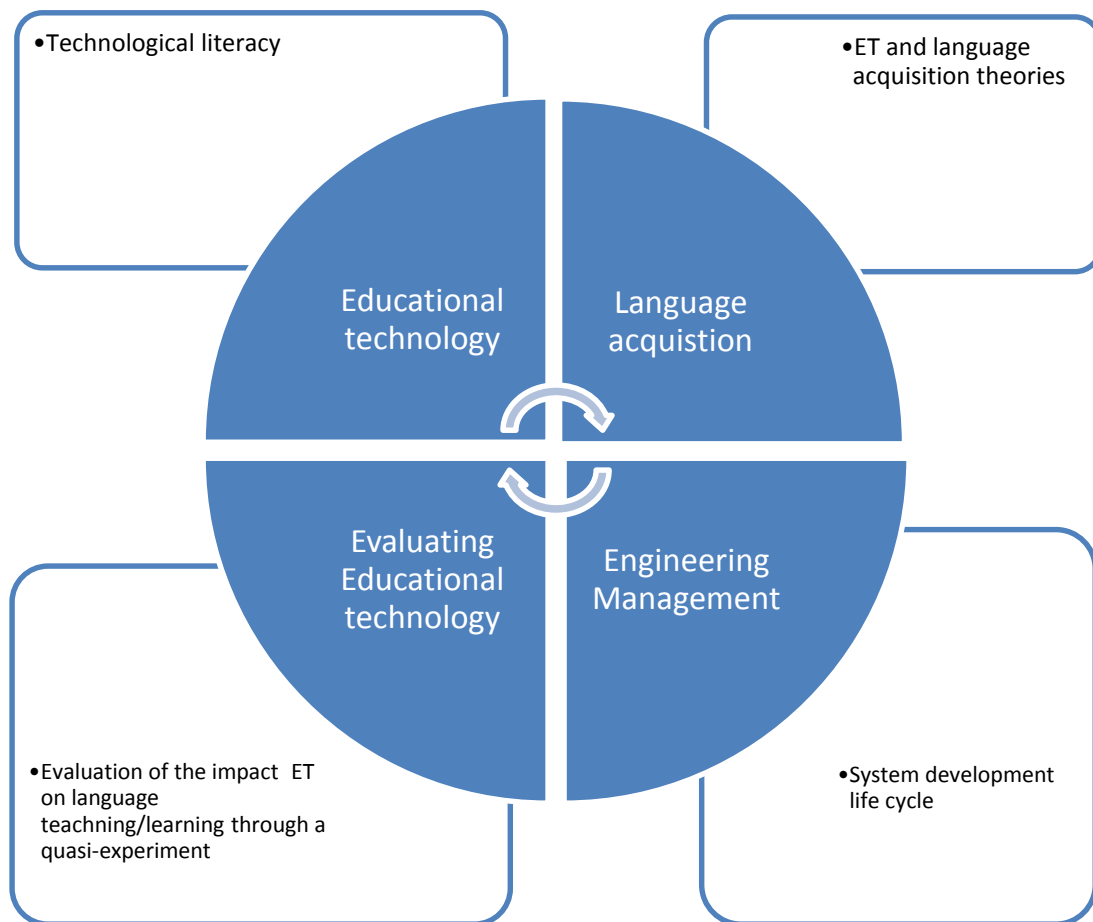


Figure 2-2 : Components of the literature review

CHAPTER 3

RESEARCH DESIGN AND METHODOLOGY

This chapter discusses the research design and methodologies used. It explains the rationales behind choosing the methodologies. Preliminary research in form of a test was conducted along with surveys sent out to teachers at a language institute and other students to assess the importance of ET to them. Also, a quasi-experiment was conducted on two groups to measure the effect of educational technology with the use of tests.

3.1 Research methods time table

Research period	Research methods
Sep 10, 2015 – Nov 10. 2015	Surveys submitted to teachers working at one language institute. Surveys submitted to random samples using social media.
Sep 12, 2015 – Oct 29 , 2015	First experiment- teaching 30 hours <u>without</u> the use of technology.
Nov 03 2015 – Dec 03 2015	Second experiment - teaching 30 hours <u>with</u> the use of technology.

Table 3-1: Research methodologies time table

Due to time and cost limitations, convenience sample was used. The main aim was to get preliminary insight on the subject using this nonprobability sampling without occurring extra costs.

3.1 Hypothesis

This research aims to test and prove the hypothesis statements in this paper:

H1: ET enhances students' language learning abilities.

(Null Hypothesis) H2: ET doesn't have an impact on students' language learning abilities.

H3: Language learners have a positive attitude towards ET and they see the value in it.

(Null Hypothesis) H4: Language learners have a negative attitude towards ET and they don't see its value.

H5: There is a relationship between ET and technological literacy.

(Null Hypothesis) H6: There is no relationship between ET and technological literacy.

3.4 Research Methods

This research consists of many research methodologies. For instance, the researcher as a teacher observed the teaching/learning environment. The researcher also did some field experiment by manipulating some variables and encouraging the use of different

technologies in the classroom. A mobile phone was normally not allowed in the teacher's classroom. However, the teacher allowed it to determine whether that aids in information retention and/or in a better learning experience.

The observation is qualitative in nature and is based on the observer's point of view. Therefore, two surveys were made to gather reliable quantitative data and eliminate any bias views. One was sent to 15 EFL teachers working at ACEC whereas the other one was sent to students.

The focus was mainly on getting the students' point of view on the effectiveness of ET. Because, despite teachers assessing the students and their improvements through oral or written exams. These remain a very limited and short term assessment. It is the students who know their own levels of improvement or information in the long-run.

Also, due to time and other institutions' internal policy constraints. The teachers' survey could only be sent to teachers working in the researchers' institute.

The surveys were constructed online using (SurveyMonkey) an online survey tool.

The students' survey consists of seven questions. The link to that survey was sent randomly through Whatsapp; a mobile chatting application to get as many responses as possible. No demographic boundaries were set as it was sent to all age groups. Therefore, the first couple of questions in the survey are to demographically categorize respondents. The first question asks about the age of the respondent. The respondent must choose which age group he fits in, the age groups are as follows:

1. 0-15
2. 15-20
3. 20-25
4. 25-30
5. 30-35
6. 35-40
7. 40+

It is important to know the age to determine whether there is a difference or similarity between the groups' perspectives of ET. Also, it is to find out which age groups are the most active language learners. Also, if there's a relationship between age, technology literacy and polyglotism.

The second question asks the respondent to choose the his/her gender. This is to determine if the two genders share similar or different experiences. Of course, demographic questions allow for a better analysis of the sub-groups.

The third question asks respondents to choose from a list of electronic devices that they own and rank their importance to their learning. This question aims to find out the degree of the respondents' technology literacy as one of the objectives of this study is to study the relationship between ET and technology literacy.

Hence, this study focuses on one branch of ET which is language learning, knowing how many languages the respondent knew is important. This is to study whether there is a relationship between the number of languages spoken and the ease of learning a new language.

The fifth question aims to discover whether the respondents are allowed to use technologies in the classroom or if the teacher/instructor uses any form of class technologies. It is to know how many respondents has been a part of a technological based classroom. The respondents with no technological classroom background cannot provide the study with an accurate perspective on the effectiveness of ET in learning languages.

The sixth question is a statement in order to know the respondents agree or disagree with the effectiveness of ET when it comes to language learning as follows:

(I believe that technologies such as, the internet, computers, mobile phones, etc. help me in learning English or other languages. (Strongly disagree, disagree, moderately agree, agree, strongly agree))

The seventh question is as follows:

Overall, indicate how much have technologies (the internet, computers, mobile phones, etc.) helped you with learning English or any other language. They help me understand the meaning of words better.

- *They provide a better learning experience especially with the use of multimedia.*
- *Games and mobile applications create a fun learning environment.*
- *Technologies are a great learning tool.*
- *I find myself retaining information better when my teacher uses classroom technologies.*
- *Technology does not help me in learning. I don't see its importance at all.*
- *I have the same learning experience with or without technology.*

The above aims to measure the effectiveness of educational technologies when it comes to language learning from the students' perspective. The statements were written by the researcher based on literature review and previous researches. The question also allows students to add extra comments if desired or if they have any other statements to add.

Two other means of research were used; one was an observation to test one small aspect of the use ET in language learning/teaching. Online dictionaries or translators are very popular amongst language learners these days. The observation was done to test whether using technologies eliminate waste-time while searching for definitions. This was done during another experiment done by the researcher which was done at a broader level to test final achievements of students at the end of a language course.

The observation is qualitative in nature and is based on the observer's point of view. Therefore, two English tests were designed based on the curriculum taught at ACEC and distributed to English language learners. The first group consists of six Adult students aged 18-24, two females and four males. The test was designed prior to their final exams as an enrichment and evaluative test for this research. The class was divided into two groups; each group had two males and one female in order to test both genders. The test were made to gather reliable quantitative data and eliminate any bias views.

ET has numerous technologies and it is difficult to examine the impact of each single technology hence some aren't available in Bahrain. Therefore, resources and time constraints played a major role in choosing to test one part of ET. The reason for choosing to test online dictionaries is because vocabulary is the most important part of learning a language. Children learn vocabulary before they learn grammar. Having enough vocabulary enables people to communicate with each other and be understandable even without grammar. For example; students sometimes ask "Me go bathroom?" this is not grammatically correct however the purpose behind it is understandable. Dictionaries are essential to any language classrooms.

The researcher's observations as a teacher also examined the impact of using electronic flash cards instead of printed flash cards.

The internet was used for ease of access to journals and e-books to gather secondary data from literature. Surveys and observations were uses to gather primary data for this research. It was important to combine both to make up for the deficiencies and advantage from the benefits of the two.

Secondary data (past researchers) and in addition hypothetical theories, points of views and arguments related to the subject were additionally used to get an in-depth analysis and consequently comprehension of the findings.

As Philip (1998) contended that utilizing a scope of methodological methodologies implies that the scientists not essentially benefit a specific method for taking a peek at the

social world. He recommend that such differing qualities includes methodological majority and in addition postmodernism which urges diverse voices to be heard and encouraging the investigation of distinctive truth.'(Philip, 1998)

3.4 The experiment:

A quasi-experiment was conducted to measure the effectiveness of ET on language teaching/learning. Normally, pre-tests and post-tests are conducted in a quasi-experimental design. There was a pre-test conducted by the researcher's institution which the researcher had no control on. The pre-test is done by the language institution to determine the level of the student. Despite having no control, the pre-test provided the researcher with the sample size and tendency. The observer taught the same level for different students over the course of two sessions. The observer also lacked control over the size or demographics of the class in each session. The dependent variable which the researcher has defined as y-variable is the level the students study. Both groups did the same level using the same books. The x-variable is the independent variable that the researcher has changed in order to evaluate the outcome of ET on language teaching/learning. The size or demographics of the two groups is also a subject independent variable however one that the researcher had no control on.

This experiment was necessary in order to somehow test the generated hypothesis through research. In this case, the researcher as a language teacher experimented over the course of two semesters. The groups varied in size and demographics however all at the same language level were using the same materials. The first group was taught the material strictly with no use of technology in the classroom. No mobile phones were allowed to search for meaning/translation or to help with comprehension. The only form of technology used was audio CDs for listening tasks. The first group consisted of six students in total; five Bahrainis and one Saudi between the ages of 16-28. Gender wise, four males and two females. The second group consisted of seven students; five Bahrainis

and two Saudis. Again, more males than females; five males and two females. All students in both groups were monolingual Arabic speakers.

As in most experimental researches, both of the groups spent five weeks learning the same material with one change in one variable. The second group was allowed to use their mobile phones or any handheld technological gadget. The teacher also used technologies in the classroom such as projectors and electronic flash cards to associate picture with meaning.

The downside to allowing students to use their mobile phones for learning purposes was that students became somehow dependent on the technology. Students were unhappy when they were not allowed to use their mobile phones during the exam. Of course, using mobile phones could lead to cheating hence they could not be allowed. Also, it was hard to control what the students were using the mobiles phone. For example, teacher would ask them to search for the meaning of a word. Students were observed using social media on their mobile phones instead of searching for meaning.

Moreover, the fact that the two groups were not similar in terms of size and demographics made it difficult to determine whether the results of the tests were because of the use o technology or merely because of their attitudes towards learning.

CHAPTER 4

DISCUSSION OF RESULTS AND FINDINGS

This chapter consists of the results of the conducted tests and discussions. It presents the researcher's point of view with regards to observation.

4.1 Discussions and findings from observations

The first observation from conducting tests to both groups was that the students looked frustrated and they struggled using the printed dictionary. It took them much longer to search for words in alphabetical order, there was no easy quick search option. Also, some dictionaries might have different ways of defining words and to go through many physical dictionaries would be a tiring time consuming job. Whereas, by putting a certain word in a search engine you will find yourself with at least a dozen links to a dozen dictionaries. Another crucial thing for language learners is pronunciation. In order to know how to pronounce a word you need to hear it or you need to be able to read and understand phonetic script. Phonetic script relates to the science of phonetics which represents spoken language and speech sounds each with a single symbol. Phonetic script is very difficult and students must be taught how to read the signs and interpret the sounds. It takes a lot of practice to recognize the same. Learning that is to some degree like learning another language and creates difficulties and more time and effort spent in learning that in order to pronounce words in a printed dictionary. Online dictionaries do have phonetic script next to a word but there is no need to be able to read it as most online dictionaries have an icon to click and listen to pronunciation of words. What's even better is that you can listen to pronunciation in US and/or UK versions. This fact alone adds to the efficiency and cuts a lot of time in learning a language.

Having said that, it does not mean that online education is error free. It was observed that some students could not even access the internet to use online dictionaries due to low speed internet service or no service or wireless internet connection available. This limits education because technology fails and if there is no internet coverage. However, others have obviously thought of this thus there are now mobile application versions of dictionaries that do not require internet connection.

The next advantage to using applications than printed dictionaries is that they are cheaper than the later. Thousands of word can be stored in a mobile phone or tablet without adding weight. These words would only take virtual space. As for physical printed dictionaries, the more words they have the heavier they get and harder to carry around.

4.2 Results of the quasi-experiment:

The first group was taught English without the use of technology. The material was dense and the test was not easy. Four out of six students failed the course which is a staggering 80% of the students. With the second group 100% of the class passed the course. Readers should not be under the impression that the use of technology leads to 100% success rate as one cannot control the students' comprehension, interest or attitude towards learning. It just happened that all learners in the second group had a positive attitude towards learning. Of course, they were not allowed to use technologies during the exam which could lead to cheating. This is one of the biggest dangers associated with using technologies in the classroom.

	Test results - without the use of educational technology	Test results with the use of educational technology
1	56	89.4
2	32.2	96
3	46	93.5
4	87.5	77.2
5	76.2	83.1
6	61.4	74
7		69.8

Table 4-1: Quasi experiments' test results

	<i>Test results <u>without</u> the use of educational technology</i>	<i>Test results <u>with</u> the use of educational technology</i>
Mean	59.88333333	83.28571429
Variance	401.0816667	101.4214286
Observations	6	7
Hypothesized Mean Difference	0	
Df	7	
t Stat	-2.594892597	
P(T<=t) one-tail	0.017844787	
t Critical one-tail	1.894578605	
P(T<=t) two-tail	0.035689574	
t Critical two-tail	2.364624252	

Table 4-2: T-test: Two-Sample Assuming Unequal Variances

From the two-tail table it can be seen that it is less than 0.05 which means that there is a significant difference statistically between the test results for the group that was taught without the use of technology and the group that was taught with the use of ET.

4.3 Hypothesis findings and survey results

The below are the researcher's findings on the generated hypothesis:

H1: ET enhances students' language learning abilities.

As observed through the quasi-experiment and observation, using ET certainly enhanced students' language learning abilities and test scores.

H4: Language learners have a positive attitude towards ET and they see the value in it.

Most language learners that were observed did have a positive attitude towards the use of technology. However, some questioned why the teacher would ask them to look for meaning of words instead of simply giving them the answer. Some students expect teachers to do all the work. Nonetheless, technology use by the teacher certainly helped in means of vocabulary when associating pictures with words and information retention.

H6: There is a relationship between ET and technological literacy.

There is a relationship between ET and technological literacy. A technological illiterate teacher would not incorporate technologies in the classroom due to various reasons. However, 10 out of 10 teacher's survey respondents were technology literate. It is hard to find people that do not use one form of technology in this day and age.

The following pages contain surveys data that was conducted by teachers and students.

Teachers' Surveys

Which of the following electronic devices do you use? (Please select all that apply.)

Answer Options	Response Percent	Response Count
Blu-ray Player (standalone or portable)	0.0%	0
Desktop Computer	30.0%	3
Laptop Computer	80.0%	8
Tablet computer (e.g. iPad, Samsung Galaxy)	40.0%	4
Digital Video Recorder (DVR)	20.0%	2
Digital Camera	10.0%	1
E-book Reader (e.g., Kindle, Nook)	10.0%	1
GPS Device (e.g., Garmin, TomTom, in-car)	10.0%	1
High Definition TV (HDTV)	30.0%	3
MP3 Player (e.g., iPod shuffle)	0.0%	0
Printer	80.0%	8
Satellite Radio Player (e.g., SiriusXM player)	0.0%	0
Streaming Media Device (e.g., Roku, AppleTV,	10.0%	1
I don't own any of these electronic devices	0.0%	0
<i>answered question</i>		10
<i>skipped question</i>		0

How long have you been teaching?

Answer Options	Response Percent	Response Count
Less than 1 year	20.0%	2
1-3 years	10.0%	1
4-7 years	40.0%	4
8-10 years	0.0%	0
11-15 years	10.0%	1
Other (please specify)	20.0%	2
<i>answered question</i>		10
<i>skipped question</i>		0

Number	Response Date	Other (please specify)	Categories
1	Sep 20, 2015 8:32 PM	more than 20 years	
2	Sep 20, 2015 5:39 PM	20 years	

Have you ever used any form of technology in the classroom?

Answer Options	Response Percent	Response Count
Yes	90.0%	9
No	10.0%	1
<i>answered question</i>		10
<i>skipped question</i>		0

If yes, which one/s?

Answer Options	Response Percent	Response Count
Teacher's computer station	55.6%	5
Projector	66.7%	6
Smartboard	66.7%	6
Audio	44.4%	4
DVD player	44.4%	4
Ipad, Ipod	22.2%	2
Mobile Apps	44.4%	4
Other (please specify)	22.2%	2
<i>answered question</i>		9
<i>skipped question</i>		1

Number	Response Date	Other (please specify)	Categories
1	Oct 3, 2015 11:23 AM	Personal Laptop. Cellphone for timer	
2	Sep 20, 2015 8:32 PM	overhead projector	

How often do you integrate student-centered technology into your classroom instruction?

Answer Options	Response Percent	Response Count
Daily	20.0%	2
1-2 times per week	30.0%	3
3 or more times per week	10.0%	1
1-2 times per month	30.0%	3
never	10.0%	1
<i>answered question</i>		10
<i>skipped question</i>		0

How often do you use computer technology resources to collect data and monitor your students' progress?

Answer Options	Response Percent	Response Count
Daily	40.0%	4
1-3 times per semester	10.0%	1
4 or more times per semester	0.0%	0
never	50.0%	5
<i>answered question</i>		10
<i>skipped question</i>		0

Do you allow students to use their mobile phones during the class?

Answer Options	Response Percent	Response Count
Yes	80.0%	8
No	20.0%	2
<i>answered question</i>		10
<i>skipped question</i>		0

If yes, for which of the following reason/s;			
Answer Options	Response Percent	Response Count	
Dictionary/translator	75.0%	6	
Spelling Applications	37.5%	3	
Chat during classroom	0.0%	0	
Other personal reasons	0.0%	0	
Other (please specify)	37.5%	3	
answered question			8
skipped question			2
Number	Response Date	Other (please specify)	Categories
1	Sep 20, 2015 8:32 PM	grapher (not everyday)	
2	Sep 20, 2015 6:26 PM	Google missing info about discussed topics	
3	Sep 20, 2015 5:39 PM	Images	

How do you feel about using technology as a teaching/learning tool?			
Answer Options	Response Percent	Response Count	
Technology is essential to the success of my classes.	0.0%	0	
Technology can be a useful tool and I encourage	100.0%	10	
Technology is optional in my classes.	0.0%	0	
I have no use for technology in my classes	0.0%	0	
answered question			10
skipped question			0

10. In your opinion, are mobile applications a good way to teach/learn a language? Please justify.

Answer Options	Response Count
	10
<i>answered question</i>	10
<i>skipped question</i>	0

Number	Response Date	Response Text	Categories
		Yes, mobile applications are a good way to teach and learn. Students these days are so familiar with their phones, tablets, and computers. They are locked in. Why not use that environment to help them learn? You can start a twitter conversation in your class, or a class whats app group where the students can share answers.	
1	Oct 3, 2015 11:23 AM	It's important to work with the students where you can. Good to learn a new language on the go, away from a computer. Online radio apps such as TuneinRadio are a good way to practice your listening skills. Language apps like Duolingo keep you motivated and instill a sense of progress.	
2	Sep 30, 2015 5:33 PM	When used properly, technology can be a great tool to help students learn a language. Especially when it comes to translating blocking vocabulary to their own language. I found out that students retain information better when a form of technology is used.	
3	Sep 26, 2015 4:04 PM	Mobile applications are good to get students interested. However, it should be strictly supervised to keep students on task and are using the correct apps.	
4	Sep 22, 2015 8:53 AM	I think so yes. You can bring them with you everywhere.	
5	Sep 21, 2015 2:41 PM	Yes. Students can have immediate access to resources in order to learn new vocabulary as well as to practice the pronunciation of new words. However, it should be used as an additional source and not as the main source of information/teaching.	
6	Sep 21, 2015 8:50 AM	Mobile apps have some use, but it depends on the level of the student & what they are trying to learn or practice. Students usually have questions, which they need the teacher to help them with & they can't always understand directions, so I believe there is a place for technology but it shouldn't dominate in the class & students shouldn't rely on it either.	
7	Sep 21, 2015 3:43 AM	Everyone owns a smart mobile phone or tablets. Teachers can make use of these for teaching and other education-related purpose in the class.	
8	Sep 20, 2015 8:32 PM	Yes, but I find it suitable for self-study purposes only. I prefer interpersonal communication in class. Apps they can do in any other time.	
9	Sep 20, 2015 6:26 PM	Yes! Can be accessed easily, reinforces and helps for differentiated learning!	
10	Sep 20, 2015 5:39 PM		

DOWNLOADED FROM SURVEY MONKEY ... END OF TEACHERS' SURVEY

STUDENTS' SURVEY

1. What is your age?

Answer Options	Response Percent	Response Count
0-15	0.0%	0
15-20	32.4%	12
20-25	24.3%	9
25-30	24.3%	9
30-35	10.8%	4
35-40	5.4%	2
40+	2.7%	1
<i>answered question</i>		37
<i>skipped question</i>		0

2. What is your gender?

Answer Options	Response Percent	Response Count
Male	64.9%	24
Female	35.1%	13
<i>answered question</i>		37
<i>skipped question</i>		0

3. Which of the following electronic devices do you use? How important are they to your learning?

Answer Options	I don't own one	Unimportant	Somewhere in the middle	Important	Essential	Response Count
Desktop computer	10	2	7	5	2	26
Laptop computer	2	1	11	8	4	26
Mobile phone	3	4	3	14	11	35
Tablet	5	7	6	4	0	22
USB drive or other portable storage device	2	5	5	8	2	22
Printer	3	5	4	7	1	20
Digital camera	4	8	4	4	1	21
<i>answered question</i>						37
<i>skipped question</i>						0

4. How many languages do you know?

Answer Options	Response Percent	Response Count
1	0.0%	0
2	10.8%	4
3-4	81.1%	30
5-6	8.1%	3
6+	0.0%	0
<i>answered question</i>		37
<i>skipped question</i>		0

5. Please select if applicable:

Answer Options	Response Percent	Response Count
My teacher allows the use of mobile phones or other	25.7%	9
My teacher does not allow us to use mobiles, tablets	45.7%	16
My teacher asks us to use our mobile phones for	37.1%	13
My teacher uses technologies such as her mobile	31.4%	11
My teacher does not use any form of technology in the	11.4%	4
<i>answered question</i>		35
<i>skipped question</i>		2

6. I believe that technologies such as, the internet, computers, mobile phones, etc. help me in learning English or other languages.

Answer Options	Strongly disagree	Disagree	Moderately agree	Agree	Strongly agree	Rating Average	Response Count
	1	3	4	12	17	4.11	37
<i>answered question</i>							37
<i>skipped question</i>							0

7. Overall, Indicate how much have technologies (the internet, computers, mobile phones, etc.) helped you with learning English or any other

Answer Options	Response Percent	Response Count
They provide a better learning experience especially Games and mobile applications create a fun learning	54.1%	20
Technologies are a great learning tool.	32.4%	12
I find myself retaining information better when my Technology does not help me in learning. I don't see	62.2%	23
I have the same learning experience with or without	16.2%	6
Other (please specify)	5.4%	2
		2
		1
<i>answered question</i>		37
<i>skipped question</i>		0

End of Student's survey

Analysis of survey results

	Mean	Std. Deviation	N
Age	3.4054	1.34287	37
Gender	1.3514	.48398	37
Desktop	1.5000	1.39284	26
Laptop	2.4231	1.06482	26
Mobile	2.7429	1.26823	35
Tablet	1.4091	1.05375	22
USB Drive or storage	2.1364	1.16682	22
Printer	1.9000	1.20961	20
Digital	1.5238	1.16701	21
Languages	3.2162	.71240	37
Teacher allows the use technology	.2432	.43496	37
Teacher doesn't allow the use technology	.4324	.50225	37
Teacher asks to use technology	.3514	.48398	37
Teacher uses technology	.4324	.50225	37
Teacher does not use technology in the classroom	.1081	.31480	37
Technology helps in learning	3.1351	1.08429	37
Technology provides a better learning	.4865	.50671	37
Games & technology create a fun learning environment	.3243	.47458	37
Technologies are great learning tools	.6216	.49167	37
Retention is better when used at class	.1622	.37368	37
Technology does not help	.0541	.22924	37

Table 4-3: Descriptive statistics

		Age	Gender	Languages	T allows the use of technology	T doesn't allow the use of technology	Teacher Asks to use technology	Teacher uses technology	Teacher does not use technology at class	Technology helps in learning	Technology provides better learning	Games and technology create a fun learning environment	Technologies are learning tools	Retention is better when used at class
Age	Pearson Correlation	1	-.268	.138	-.126	.145	-.268	-.350*	-.041	-.134	-.012	-.168	-.056	-.135
	Sig. (2-tailed)		.109	.415	.458	.393	.109	.034	.810	.429	.943	.319	.743	.427
	Sum of Squares and Cross-products	64.919	-6.270	4.757	-2.649	3.514	-6.270	-8.486	-6.22	-7.027	-.297	-3.865	-1.324	-2.432
	Covariance	1.803	-.174	.132	-.074	.098	-.174	-.236	-.017	-.195	-.008	-.107	-.037	-.068
	N	37	37	37	37	37	37	37	37	37	37	37	37	37
Gender	Pearson Correlation	-.268	1	-.146	-.153	.043	-.067	-.386*	.108	-.383*	.303	.095	-.341*	.137
	Sig. (2-tailed)	.109		.389	.365	.799	.692	.018	.523	.019	.068	.577	.039	.419
	Sum of Squares and Cross-products	-6.270	8.432	-1.811	-1.162	.378	-.568	3.378	.595	7.243	2.676	.784	2.919	.892
	Covariance	-.174	.234	-.050	-.032	.011	-.016	.094	.017	.201	.074	.022	.081	.025
	N	37	37	37	37	37	37	37	37	37	37	37	37	37
Languages	Pearson Correlation	.138	-.146	1	-.085	.120	-.065	.275	-.107	.177	-.146	.115	-.156	-.031
	Sig. (2-tailed)	.415	.389		.618	.481	.701	.100	.528	.295	.390	.496	.355	.855
	Sum of Squares and Cross-products	4.757	-1.811	18.270	-.946	1.541	-.811	3.541	-.865	4.919	-1.892	1.405	-1.973	-.297
	Covariance	.132	-.050	.508	-.026	.043	-.023	.098	-.024	.137	-.053	.039	-.055	-.008
	N	37	37	37	37	37	37	37	37	37	37	37	37	37
Teacher Allows the use technology	Pearson Correlation	-.126	-.153	-.085	1	-.495**	-.153	-.241	-.197	-.307	-.048	.145	-.207	-.079
	Sig. (2-tailed)	.458	.365	.618		.002	.365	.152	.242	.064	.779	.390	.219	.644
	Sum of Squares and Cross-products	-2.649	-1.162	-.946	6.811	-3.892	-1.162	-1.892	-.973	-5.216	-.378	1.081	-1.595	-.459
	Covariance	-.074	-.032	-.026	.189	-.108	-.032	-.053	-.027	-.145	-.011	.030	-.044	-.013
	N	37	37	37	37	37	37	37	37	37	37	37	37	37
Teacher does not Allow the use technology	Pearson Correlation	.145	.043	.120	-.495**	1	-.071	.119	.047	.196	.133	-.139	-.106	-.088
	Sig. (2-tailed)	.393	.799	.481	.002		.676	.483	.780	.246	.433	.413	.531	.605
	Sum of Squares and Cross-products	3.514	.378	1.541	-3.892	9.081	-.622	1.081	.270	3.838	1.216	-1.189	-.946	-.595
	Covariance	.098	.011	.043	-.108	.252	-.017	.030	.008	.107	.034	-.033	-.026	-.017
	N	37	37	37	37	37	37	37	37	37	37	37	37	37
Teacher Asks to use technology	Pearson Correlation	-.268	-.067	-.065	-.153	-.071	1	.272	-.256	.172	.303	.216	.224	.444**
	Sig. (2-tailed)	.109	.692	.701	.365	.676		.104	.126	.310	.068	.200	.183	.006
	Sum of Squares and Cross-products	-6.270	-.568	-.811	-1.162	-.622	8.432	2.378	-1.405	3.243	2.676	1.784	1.919	2.892
	Covariance	-.174	-.016	-.023	-.032	-.017	.234	.066	-.039	.090	.074	.050	.053	.080
	N	37	37	37	37	37	37	37	37	37	37	37	37	37
Teacher uses technology	Pearson Correlation	-.350*	-.386*	.275	-.241	.119	.272	1	-.304	.298	.133	.094	.231	.208
	Sig. (2-tailed)	.034	.018	.100	.152	.483	.104		.067	.073	.433	.578	.169	.217
	Sum of Squares and Cross-products	-8.486	3.378	3.541	-1.892	1.081	2.378	9.081	-1.730	5.838	1.216	.811	2.054	1.405
	Covariance	-.236	.094	.098	-.053	.030	.066	.252	-.048	.162	.034	.023	.057	.039
	N	37	37	37	37	37	37	37	37	37	37	37	37	37

Teacher does not use technology at class	Pearson Correlation	-.041	.108	-.107	-.197	.047	-.256	-.304	1	.119	-.165	-.241	.092	-.153
	Sig. (2-tailed)	.810	.523	.528	.242	.780	.126	.067		.484	.330	.150	.587	.365
	Sum of Squares and Cross-products	-.622	.595	-.865	-.973	.270	-1.405	-1.730	3.568	1.459	-.946	-1.297	.514	-.649
	Covariance	-.017	.017	-.024	-.027	.008	-.039	-.048	.099	.041	-.026	-.036	.014	-.018
	N	37	37	37	37	37	37	37	37	37	37	37	37	37
Technology helps in learning	Pearson Correlation	-.134	.383*	.177	-.307	.196	.172	.298	.119	1	.383*	.236	.568**	.150
	Sig. (2-tailed)	.429	.019	.295	.064	.246	.310	.073	.484		.019	.159	.000	.375
	Sum of Squares and Cross-products	-7.027	7.243	4.919	-5.216	3.838	3.243	5.838	1.459	42.324	7.568	4.378	10.892	2.189
	Covariance	-.195	.201	.137	-.145	.107	.090	.162	.041	1.176	.210	.122	.303	.061
	N	37	37	37	37	37	37	37	37	37	37	37	37	37
Technology provides better learning	Pearson Correlation	-.012	.303	-.146	-.048	.133	.303	.133	-.165	.383*	1	.365*	.313	.159
	Sig. (2-tailed)	.943	.068	.390	.779	.433	.068	.433	.330	.019		.026	.059	.348
	Sum of Squares and Cross-products	-.297	2.676	-1.892	-.378	1.216	2.676	1.216	-.946	7.568	9.243	3.162	2.811	1.081
	Covariance	-.008	.074	-.053	-.011	.034	.074	.034	-.026	.210	.257	.088	.078	.030
	N	37	37	37	37	37	37	37	37	37	37	37	37	37
Games and technology create a fun learning environment	Pearson Correlation	-.168	.095	.115	.145	-.139	.216	.094	-.241	.236	.365*	1	.064	.478**
	Sig. (2-tailed)	.319	.577	.496	.390	.413	.200	.578	.150	.159	.026		.705	.003
	Sum of Squares and Cross-products	-3.865	.784	1.405	1.081	-1.189	1.784	.811	-1.297	4.378	3.162	8.108	.541	3.054
	Covariance	-.107	.022	.039	.030	-.033	.050	.023	-.036	.122	.088	.225	.015	.085
	N	37	37	37	37	37	37	37	37	37	37	37	37	37
Technologies are learning tools	Pearson Correlation	-.056	.341*	-.156	-.207	-.106	.224	.231	.092	.568**	.313	.064	1	.041
	Sig. (2-tailed)	.743	.039	.355	.219	.531	.183	.169	.587	.000	.059	.705		.810
	Sum of Squares and Cross-products	-1.324	2.919	-1.973	-1.595	-.946	1.919	2.054	.514	10.892	2.811	.541	8.703	.270
	Covariance	-.037	.081	-.055	-.044	-.026	.053	.057	.014	.303	.078	.015	.242	.008
	N	37	37	37	37	37	37	37	37	37	37	37	37	37
Retention is better when used at class	Pearson Correlation	-.135	.137	-.031	-.079	-.088	.444**	.208	-.153	.150	.159	.478**	.041	1
	Sig. (2-tailed)	.427	.419	.855	.644	.605	.006	.217	.365	.375	.348	.003	.810	
	Sum of Squares and Cross-products	-2.432	.892	-.297	-.459	-.595	2.892	1.405	-.649	2.189	1.081	3.054	.270	5.027
	Covariance	-.068	.025	-.008	-.013	-.017	.080	-.039	-.018	.061	.030	.085	.008	.140
	N	37	37	37	37	37	37	37	37	37	37	37	37	37

*. Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

Table 4-4: Correlations of surveys' data

The highlighted in green shows the correlations. As can be seen, there is a significant correlation between the use of technology and retention of information. Also, there are positive correlations between age, gender and the use of technology. Games and technology seem to have a positive correlation in creating a fun learning environment thus leading to better retention of information.

Survey results and analysis have indicated that both teachers and students realize the importance of educational technology. The survey results led to the decision of performing a quasi-experiment to measure the effects of technology.

The results of the quasi-experiment showed a significant learning outcome with the use of technology. Of course, there were other factors which the researcher could not control such as students' motivation. It was observed that using technology did help in create a fun learning environment. For example, the researcher taught the students vocabulary associated with musical styles. The researcher used a mobile phone to play different music and elicited the vocabulary from the students. Students had a great time and there was no boredom. Technologies can help creating an interactive environment.

CHAPTER 5

DISCUSSIONS, RECOMMENDATIONS AND CONCLUSION

5.1 Conclusion and discussions

In conclusion, research evidence conducted on the same topic over the last four decades identifies the positive benefits of ET on learning. Considering the different technologies, learning methodologies, system and contexts used by institutions, getting a clear and accurate evaluation of the impacts of using ET methodologies is quite difficult. However, this research has shown impressive positive impacts of ET on language learning.

Studies on the subject of ET have shown small yet consistent positive educational outcomes. It is not possible to deduce a perfunctory link from doing this type of research. There is a probability that some schools can use the same technologies and ICT more efficiently and effectively than others. Also, some students might find ET more beneficial than others. This research has proved that the use of ET on language learning has a significantly large educational outcome. Therefore, more research has to be done on the same subject in the Kingdom of Bahrain. Before implementing classroom technologies, educational institutions must do a proper research. The following might help with research or decision. The rationale behind the impact of ET on language learning/teaching should be clear and consistent:

1. Who will it help more, teachers or students?
2. How will technologies help in the context of language learning? Will they perform in a more intensive, efficient, effective way?
3. Will the teachers deliver information more efficiently or effectively with the use of technology?

4. Can the institution afford the costs associated with purchasing, maintaining and repairing such technologies?

Overall, research has shown that the use of technology in the classroom stimulates and motivates the learners. Technology offers an interactive educational experience and can even be fun if educational games are used.

ET can allow learners to learn at their own speed hence no learner learns at the same pace or the same way. The use of technology can help retain information better. For instance, classroom activities or lessons conducted on electronic devices such as tablets or laptops can allow learners to read instructions, and process what their reading and then complete the task at their own speed. This is beneficial to the teacher as well because it frees her so she can further guide or assist learners that require that kind of attention.

Technology like search engines, videos, portable devices, educational applications and interactive activities equip learners with an almost endless supply of resources and information. Technology can also serve as a tool, allowing a 24/7 learning support or experience. Learners can access online lesson plans, they can use interactive learning games or educational applications. For language learners there is a 24/7 access to online dictionaries where you can listen to the pronunciation of a certain word, something that is not possible with a normal dictionary. Also, they can access online videos of lessons and graphics. Most books nowadays have e-version which allows students to access the material anytime and from anywhere without having to carry a heavy book around.

Technology has evolved over the years and has become a part of humans' lives. Therefore, using ET in modern day schools is inevitable. That use helps in preparing young learners for the future in which technology will advance more and more.

Having said that, many people think that ET means spending a lot of money on expensive and advanced classroom technologies and then spending more resources on training teachers to use those technologies. However, this is a misconception as the most expensive technologies do not necessarily lead to an efficient and effective

teaching/learning experience. Most times, simple technological solutions result in a more effective and efficient teaching and thus a better learning experience. This is mostly because if you introduce high end expensive technologies and train or not train teachers on using them. Some might be change resistant as they might not accept to change their way of teaching. They might also not be comfortable using those technologies either because they don't know how or they worry they will do something wrong that could cause damage to those expensive technologies.

Of course, an educational institution that wants to incorporate technology must most importantly figure out the reason that made them consider incorporating technology and must study its effects on their teaching or learning. They must also study different technologies and determine which will be best for their institution. As previously mentioned not all technologies work for all institutions as they have different needs, methods and setup. Another thing with the incorporating technology into education is having the necessary technological support and infrastructure capacity for ET. Technology requires constant maintenance and repair in case of malfunction which can happen often. This means the educational institution must hire information technology personnel for that purpose. Operating advanced technologies require electricity and at times internet connection. This means electricity and internet bills will rise. Therefore, proper planning must be done to forecast if such costs can be afforded.

Furthermore, the curriculum must be redesigned and customized. As mentioned before, this calls for the creation of a new role; an ET engineer. The engineer must not only come from an engineering background but he needs EM and educational capabilities to engineer technological based curriculums with the help of educators and manage a technical enterprise which is the educational institution.

The author of this research argues that because of the popularity of mobile applications based learning, there is a need for a proper study and engineering of a special mobile

application. The mobile application should be reliable and error free. There are many applications available in the market that teach incorrect grammar and pronunciation.

4.2 Limitations of the study and suggestions

This research was supposed to act as a preliminary research for the researcher to engineer a mobile application for learning English. The researcher had a very successful trial of learning Italian using technologies hence wanted to create a reliable application for Arabic speakers. Unfortunately, this couldn't be done due to time and finances limitations. The researcher is still experimenting with classroom technologies and is doing a long term experiment. The research is also studying theories on memory training that would help with further cognition of languages. All of those studies could lead to a research that could result in the creation of a mobile application.

It would be excellent if a mobile engineer and an educator could collaborate together to research this topic and go through the steps of the "SDLC". Thus, eliminating the cost of hiring an external engineer to create the application.

APPENDIX A: STUDENTS' SURVEY

1. What is your age?

- 0-15
- 15-20
- 20-25
- 25-30
- 30-35
- 35-40
- 40+

2. What is your gender?

- Male
- Female

3. Which of the following electronic devices do you use? How important are they to your learning?

	I don't own one	Unimportant	Somewhere in the middle	Important	Essential
Desktop computer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Laptop computer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mobile phone	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tablet	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
USB drive or other portable storage device	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Printer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Digital camera	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

4. How many languages do you know?

- 1
- 2
- 3-4
- 5-6
- 6+

5. Please select if applicable:

- My teacher allows the use of mobile phones or other technologies in the class for personal purposes.
- My teacher does not allow us to use mobiles, tablets or any other form of technology in the classroom.
- My teacher asks us to use our mobile phones for study purposes (e.g translation, meaning of words,...)
- My teacher uses technologies such as her mobile phone, smart board, etc.. for teaching purposes.
- My teacher does not use any form of technology in the classroom.

6. I believe that technologies such as, the internet, computers, mobile phones, etc. help me in learning English or other languages.

Strongly disagree	Disagree	Moderately agree	Agree	Strongly agree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

7. Overall, Indicate how much have technologies (the internet, computers, mobile phones, etc.) helped you with learning English or any other language. They help me understand the meaning of words better.

- They provide a better learning experience especially with the use of multimedia.
- Games and mobile applications create a fun learning environment.
- Technologies are a great learning tool.
- I find myself retaining information better when my teacher uses classroom technologies.
- Technology does not help me in learning. I don't see its importance at all.
- I have the same learning experience with or without technology.

Other (please specify)

APPENDIX B: TEACHERS' SURVEY

1. How long have you been teaching?

- Less than 1 year
- 1-3 years
- 4-7 years
- 8-10 years
- 11-15 years
- Other (please specify)

2. Which of the following electronic devices do you use? (Please select all that apply.)

 SurveyMonkey Audience

- Blu-ray Player (standalone or portable)
- Desktop Computer
- Laptop Computer
- Tablet computer (e.g. iPad, Samsung Galaxy)
- Digital Video Recorder (DVR)
- Digital Camera
- E-book Reader (e.g., Kindle, Nook)
- GPS Device (e.g., Garmin, TomTom, in-car navigation system)
- High Definition TV (HDTV)
- MP3 Player (e.g., iPod shuffle)
- Printer
- Satellite Radio Player (e.g., SiriusXM player)
- Streaming Media Device (e.g., Roku, AppleTV, integrated TV)
- I don't own any of these electronic devices

3. Have you ever used any form of technology in the classroom?

Yes

No

4. If yes, which one/s?

Teacher's computer station

Projector

Smartboard

Audio

DVD player

Ipad, Ipod

Mobile Apps

Other (please specify)

5. How often do you integrate student-centered technology into your classroom instruction?

- Daily
- 1-2 times per week
- 3 or more times per week
- 1-2 times per month
- never

6. How often do you use computer technology resources to collect data and monitor your students' progress?

- Daily
- 1-3 times per semester
- 4 or more times per semester
- never

7. Do you allow students to use their mobile phones during the class?

- Yes
- No

8. If yes, for which of the following reason/s;

- Dictionary/translator
- Spelling Applications
- Chat during classroom
- Other personal reasons
- Other (please specify)

9. How do you feel about using technology as a teaching/learning tool?

- Technology is essential to the success of my classes.
- Technology can be a useful tool and I encourage students to use it.
- Technology is optional in my classes.
- I have no use for technology in my classes

10. In your opinion, are mobile applications a good way to teach/learn a language? Please justify.

REFERENCES

- Abdel-Salam, T. K. (2006). Does the lack of hands-on experience in a remotely delivered laboratory course affect student learning? *European Journal of Engineering Education*, 747-756.
- Anderson, D. R. (2003). E-Learning in the 21st Century: A Framework for Research and Practice. *Definitions and Terminology Committee* .
- Ascough, R. (2007). Theory and Practice of Online Learning. *Teaching Theology & Religion*, 50-51.
- Ayersman. (1996). *Literacy Enrichment and Technology Integration in Pre-Service Teacher Education*. North Dakota, USA: IGI Global.
- Barton, P. E. (2001). Facing the hard facts in education reform. Princeton, NJ:.
[<http://www.ets.org/research/pic/facingfacts.pdf>].
- Charney. (1994). *Cyberlines 2.0: Languages and Cultures of the Internet*. Unknown: Unknown.
- Cuban, L. (2001). Oversold and underused: Computers in the classroom. MA: *Harvard University Press*.
- Cummins, J. (2005). Affirming Identity in Multilingual classrooms. *The whole child*, 38-43.
- Davies, R. S. (2008). Integrating Technology into a Science Classroom: An evaluation of inquiry-based technology integration. *D.W Sanal*.
- Education, U. D. (2001). Enhancing Education Through Technology. *Elementary and Secondary Education Act, SEC. 2402 - purposes and goals*.
- Eisenberg, M. &. (2002). *Learning and teaching information technology: Computer skills in context*. ERIC Document Reproduction No. ED 465 .

- Ertmer, P. (2005). Teacher pedagogical beliefs: The final frontier in our quest for technology integration? *Educational Technology Research and Development*, (pp. 53(4), 25-39).
- Fouts, J. (2000). . Research on computers and education: Past, present, and future. A report to the Bill and Melinda Gates Foundation.
- Hansen, J. W. (2003). To change perceptions of technology programs. *Journal of Technology Studies*, 29, 16-19.
- Heinecke, W. F. (1999). New directions in the evaluation of the effectiveness of educational technology. *U.S. Department of Education Secretary's Conference on Educational Technology*.
- Heinecke, W. F. (1999). New directions in the evaluation of the effectiveness of educational technology. *U.S. Department of Education Secretary's Conference on Educational Technology* .
- Higgins, B. &. (1992). Technology and Teacher Education Annual. *Technology and Teacher Education Annual*, 329.
- J. Bransford, A. B. (199). How people learn: Brain, mind, experience, and school. *National Research council*.
- J. Bransford, A. B. (1999). How people learn: Brain, mind, experience, and school. *National Research council*.
- Kennedy, M. M. (1999). Approximations to indicators of student outcomes. *Educational Evaluation and Policy Analysis*, 21(4), 345-363.
- Leu, D. (2006). New literacies, reading research, and the challenges of change: A Deictic perspective. . *Yearbook of the National Reading Conference.*, (pp. (1-20)). Milwaukee, WI:.
- Leu, D. J. (2000). The convergence of literacy instruction with networked technologies for information and communication. *Reading Research Quarterly*, 35(1), 108-127.
- Mayer, R. E. (1999). Cognitive Principles of Multimedia Learning: The Role of Modality and Contiguity. *Journal of Educational Psychology*, Vol 91, pp 358–368. .
- McMillan, S. (1996). . Literacy and computer literacy: Definitions and comparisons. *Computer & Education*. 27(3-4), 161-170.

- McNabb, M. H. (1999). Critical Issues in Evaluating the Effectiveness of Technology. *U.S Department of Education Secretary's Conference on Educational Technology, Washington, DC.*
- Milone, M. (1996). Beyond bells and whistles: How to use technology to improve student learning, problems and solutions. *American Association of School Administrators.*
- Mishra, P. &. (2006). Technological pedagogical content knowledge: A new framework for teacher knowledge. *Teachers college record*, 108(6),1017-1054.
- Moore, J. L., Dickson-Deane, C., & Galyen, K. (2011). E-Learning, online learning, and distance learning environments: Are they the same?". *The Internet and Higher Education 14*, 129-135.
- National Research Council D. Ellmore, S. O. (1995). Reinventing schools: The technology is now! . *Washington, DC: National Academies*, unknown.
- Nikolova, O. R. (2002). EFFECTS OF STUDENTS' PARTICIPATION IN AUTHORIZING OF MULTIMEDIA MATERIALS ON STUDENT ACQUISITION OF VOCABULARY. *Language Learning & Technology, VOL 6 No.1*, 100-122.
- O'Hara, S. &. (2006). Hypermedia authoring as a vehicle for vocabulary development for English learners. *The california reader 40*, 11-16.
- O'Hara, R. P. (2009). Vocabulary Development in the Science Classroom: Using Hypermedia. *The Tapestry Journal*, 15-29.
- paivio, A. (1986). *Mental representations: a dual coding approach*. Oxford. England: Oxford University Press.
- Peled, Z. P. (1994). An ecological approach for information technology: Intervention, evaluation, and software adoption policies. *Technology assessment in education and training*. .
- Penuel, W. R. (1999). Observing classroom processes in project-based learning using multimedia: A tool for evaluators. *the U.S. Department of Education Secretary's Conference on Educational Technology, Washington, DC.*
- Philip, L. J. (1998). Combining quantitative and qualitative approaches to social research in human geography - An impossible mixture? *Environment and planning A*, 261-267.

- Richardson, V. (1996). *The role of attitudes and beliefs in learning to teach (The handbook of research in teacher education)*. New York: MacMillan.
- Richey, R. (2008). Reflections on the 2008 AECT Definitions of the Field". *TechTrends* 52. 24-25.
- Rockman, S. (2000). A Lesson from Richard Nixon: Observations about. *U.S. Department of Education Secretary's Conference on Educational Technology*.
- Rossi, P. F. (1999). . Evaluation: A systematic approach. *Sage publishing*.
- Royce, W. (1970). Managing the Development of Large Software Systems. *Technical Papers of Western Electronic Show and Convention* (p. Unkown). Los Angeles, USA: Technical Papers of Western Electronic Show and Convention.
- Russell, M. (2001). Framing technology program evaluations. *Methods of evaluating educational technology*.
- Scardamalia, M. (2006). *Knowledge Building: Theory, Pedagogy, and Technology*. unkown: In K. Sawyer (Ed.), *Cambridge Handbook of the Learning Sciences* (pp. 97-118).
- Selwyn, N. (2011). Education and Technology: Key Issues and Debates. *Continuum International Publishing Group*. London: Continuum International Publishing Group.
- Silvin-Kachala, J. &. (2000). research report on the effectiveness of technology in schools. *Software and Information Industry Association*.
- Skinner, B. (1957). *Verbal behaviour*. Unknown: Unkown.
- Sweller, J. (1988). Cognitive Load During Problem Solving: Effects on Learning. *Cognitive Science*, Vol 12,.
- Sweller, J. a. (1994). Why Some Material is Difficult to Learn. *Cognition and Instruction*, 12, 185–233.
- Sweller, J. V. (1998). Cognitive Architecture and Instructional Design. *Educational Psychology Review*, 10, 251–296.
- Tavangarian D., L. M. (2004). Is e-learning the Solution for Individual Learning? *Journal of e-learning*.
- Umeh, A. (2008). Effective management of maximum utilization of Technological equipment. *Journal of science and Technology Research* 7(8), 79-83.

- Ungerleider, C. S. (2002). Information and communication technologies in elementary and secondary education: A state of the art review. *Pan-Canadian Education Research Agenda Symposium "Information Technology and Learning,"*.
- Zhao, Y. (2005). Education in eacher Educational Technology Professional Development: Problems and Solutionsage of globalization. *China Educational Technology*, 10-15.
- Zhao, Y. B. (2001). What's worth looking for? Issues in educational technology research. *Methods of evaluating educational technology*.