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Web-assisted Instruction (WAI) as a Promising Solution in Developing Countries in Higher Education: A Case Study in an Omani Governmental College

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Abstract
The rising expectations for changing traditional classrooms, where chalk and talk as well as desks and texts are predominant, were accelerating because of the explosion of knowledge and the growing demands of the workforce (Roschelle *et al*. 2000). Accordingly, if the goal then is to educate and qualify every student, schools are challenged to create a way to move toward what is termed "student-centric" model and give every student a chance to learn and interact. The purpose of this quantitative study was to investigate the effectiveness of technology integration (namely, web-assisted instruction) on students' achievement and attitudes in a Middle Eastern college. It was also the purpose of the study to examine whether WAI disrupted traditional teaching and encouraged educators to integrate it as a powerful means of instruction. The main focus of the study was to propose WAI as a solution to address the diverse learning styles in the class. Christensen's *disruptive innovation* theory was used as the theoretical framework to investigate if WAI was disruptive to teaching methodologies and the way educators and administrators perceive innovations. The research design was *the pretest – posttest control group design* and the study was conducted in a governmental gulf college. The participants were 54 students from level 1 foundation English distributed in two classes; experimental and control. Both classes were pre-tested and post-tested at the beginning and both were given a survey at the end of the fall semester 2011. Findings of the study substantiated the theory and revealed that freshman students who took a Core Course using WAI achieved higher test scores than those in the traditional class. It was also found that students in the experimental class reported positive preference and attitudes for technology integration in their class, and students in the control class reported a great desire to have technology integrated in their class.
Keywords: web-assisted instruction, achievement, disruptive innovations, attitude, higher education.

1. Introduction

Social scientists have made tremendous efforts to investigate higher education and its relationship to social change in developing countries (Altbach 1991 Kelly 1987 Kelly & Altbach 1986). This area of research has surprisingly not contributed significantly to the issue of computer use in education and its effect on societal changes in developing countries (Liu 1995). In addition, the majority of researchers tend to look at integrating computers into education in developing countries from the classroom perspective and their studies lack in-depth analysis about the implications for the countries at large (Liu 1995). Historically, computers were integrated into education in developing countries in the early and mid 1980s, although the concern with computer use in education was initiated at the beginning of 1970s (Liu 1995).

In developing countries, the traditional indigenous way of teaching is teacher-centered and didactic which hinders endeavors to sustain successful teaching styles for different individual needs of each student (Sife & Sanga 2007). More importantly, educational systems in general are resistant to change, which makes it difficult to support technology integration into them (Osín 1998). Nonetheless, computers have the potential to provide one of the most key ingredients of teaching tools, *individualized interactivity*, which may help overcome the aforementioned problems. This means students can interact with computer programs designed to react to their individual needs. These well-designed programs have considered the learning difficulties of topics being studied and consequently they set remedial interventions to enrich students' understandings beyond the curriculum requirements (Osín 1998).

2. Research Problem

In education, most of us cannot deny the fact that we learn differently from one another; through different methods, styles, and at different phases (Heming 2008). Additionally, all classrooms have students with multiple intelligences which require schools to find a way to address these different abilities. If the goal then is to educate every student, schools are challenged to create a way to move toward what is termed a "student-centric" model (Phillips 2005).

In the context of developing countries, the advent of the global technological revolution in the twenty-first century inspired the efforts to transfer pedagogy from its conventional classroom centered instruction to web-based interactive instruction (Cuban 1993). However, such inspiration is very scarce in the Middle East Arab countries (Nasser & Abouchedid 2000). In particular, although Arab educational policymakers are aware of the fact that improving education depends on introducing technology into education, they have made very little progress in applying technologies in institutions of higher education, which widens the gap between Arabs and global technology trends. One big attitudinal challenge is that educational decision-makers may fear that WAI would *disrupt* traditional, teacher-centered teaching into a new pedagogical project where teachers are not familiar with its techniques, content, and objectives (Nasser & Abouchedid 2000). They fear implementation of e-learning and WAI in educational institutions may result in *disruption* of content and styles of teaching for which universities will become "no lecture" institutions (Phillips 2005).

3. Theoretical Framework: Disruptive Innovation Theory

Disruptive innovation theory explains how organizations fail or succeed in creating innovations and predicts how organizations struggle with adopting certain innovations. It asserts there are two types of performance trajectories in all markets. The first trajectory "*sustaining innovation*" represents the pace of improvement that companies deliver to their customers by either introducing new services or improving them. That is, it is a kind of routine process that companies follow in order to satisfy the needs of their customers and keep in touch to stay in service with them; they are periodic upgrades to systems (C. Christensen *et a.l* 2003 C. Christensen *et al.* 2011 Yu & Hang 2010).

On the other hand, in the second trajectory, there is a kind of innovation that emerges in industry and is not merely a breakthrough improvement, but it disrupts the performance trajectory altogether by providing the market with a product that is totally not as good as what the company is offering its customers. Actually, this "*disruptive innovation"* is not used by existing customers who cannot use it because it is not as good as the services they use, but by making the product affordable and easy to use, people who were not able to use the sustaining innovation products - nonconsumers - get benefit of it and use it. After all, "*disruptive innovation is not equal to destructive innovation*" (Yu & Hang 2010 p. 439).

In this study, *Disruptive Innovation Theory* was used to explain how organizations, such as colleges, fail or succeed in creating innovations and predict how colleges struggle with adopting certain innovations. In fact, the theory postulates that most successful technologies incorporate three conditions (Abel 2005). First, there is a real compelling reason to adopt. Second, it enhances how users are performing something they already do, and not radically change what they do. In other words, integrating technology does not have the main purpose of replacing the whole body of teaching practices, rather it facilitates effective teaching. Third, they appeal to the nonusers and provide them with approaches to accomplish tasks they probably need to achieve but have not had an easy way to get it done. Web-assisted instruction might be a disruptive innovation for a traditional knowledge delivery system where lectures are teacher-centered and students take notes to be tested on exams. The theory was also used in this context to investigate the barriers innovations might face when integrated into bureaucratic systems of teaching and how they are accepted later in teaching after they prove their efficiency and effect on increasing achievement and motivation of students.

4. WAI as Disruptive Technology in Developing Countries

Employing computers and web-based applications in education where indigenous teaching prevails has the potential to disrupt the system and offer a way for students to learn differently and more individually. WAI is considered disruptive because the trend of indigenous teaching in developing countries is teacher-directed and it does not provide students with the creative skills or at least with knowledge that lasts after the school course (Udovic *et al.* 2002).

Second, the disruptive transition from teacher–led to software–delivered instruction is likely to proceed in two stages. The first stage is computer-based learning. The software in this stage is relatively expensive and it is still monolithic with respect to students' preferred methods of learning. Initially, the instructional methods of WAI mirrored largely the dominant style of learning in each subject. The second stage of this disruption is called student–centric technology. The software in this phase develops so it helps students learn each subject in a manner consistent with their learning needs (C. Christensen *et al*. 2011).

Web-assisted Instruction (WAI) is a powerful means today to enable educators in developing countries to meet new demands and has many proponents who believe in its benefits. But, studies on the effectiveness of technology in classrooms often have contradictory findings which make it difficult to generalize (Roschelle *et al*. 2000). After all, proponents of WAI believe there are three elements of learning technology, which motivate it to be the mainstream in educational institutions. First, universities have incorporated more technological infrastructure in terms of wireless Internet, smart boards, and different network applications. Second, course management systems (CMSs) provide students with access to online communication including syllabi and other related class materials. Third, there is a rapidly growing number of online courses and programs taking place for distance learning (Abel 2005). Universities in developing countries desire to take these same steps to incorporate technology, but encounter different issues than universities in developed countries.

In Oman, the adoption of technology for instruction is facing external and internal barriers to its expansion. External barriers include limited resources, lack of time, and lack of technical support. Internal barriers relate to teachers' degree of confidence, negative attitudes, and resistance to changing the medium of teaching (Al-Senaidi *et al*. 2009). In other words, integrating technology as an instructional tool would be disruptive to the methods that Omani instructors are employing. For example, Sultan Qaboos University (SQU) started to implement e-learning tools using WebCT in 2001, and at that time there were only 8 online courses and 981 users. By the end of 2002, the number of courses increased to 40 and students were 3001 (Al Musawi & Abdelraheem 2004). Another example is the College of Applied Sciences (CAS). CAS initiated the project of using blackboard for e-learning in 2007 and there were only 15 online courses and 581 users. By the end of 2008, there were 30 courses and 890 students.

In the process of teaching and learning, students are looking for change and they no longer expect to be taught sequentially. Consequently, the traditional, teacher-centered, lecture-based model of teaching in universities is threatened by the increased presence of technology, including simulation, games technology, telepresence (e.g., videoconferencing), teleimmersion (geographically separated sites contacting as if they are face to face in real time), e-mail, and online teaching (Lafferty & Edwards 2004). The National Academy of Sciences (2002) asserted that technology is changing the relationship between people and the way they access knowledge, but also declared that universities are slow in adopting these changes. Wulf (2003) stated if knowledge is at the core of university's goals, and technology changes the ability of students to process information and knowledge, then there must be an impact on how universities fulfill their missions. These same ideas apply to universities in developing countries.

5. Purpose of the Study

The purpose of the study was to examine the effectiveness of Web-assisted Instruction on students' standardized test scores in beginning Core Course classes at a Middle East college. Level 1 grammar classes designed for freshmen students were used to investigate their perspectives about WAI and whether they believed it was disruptive innovation that contributed to their success.

6. Research Questions and Hypotheses

1. Did WAI increase freshmen' test scores in Level 1 grammar classes at a Middle East College?
   a. **Hypothesis**: Freshman students who took Core Course using WAI will have higher test scores than those in the traditional class (Instrument: Pre-test/post-test)
2. What are freshman students' perceptions of their technology use, preferences, and expertise?
   a. **Hypothesis**: Freshman students who took Core Course class using WAI will report a positive preference for technology integration, and freshmen students in non-technology classes reported desire to integrate technology in their classes (Instrument: Student Technology Survey, Items 1-11)
3. What are freshman students' perceptions about WAI in their Core Course class?
   a. **Hypothesis**: Freshman students will report positive attitudes toward the use of WAI in their Level 1 Core Course (Grammar). (Instrument: Student Technology Survey, Item 12)

7. Methodology

The pretest-posttest control group design - which falls under quasi-experiment research - was used in the study. In the study, there are two groups of participants: a control group and an experimental group. Both groups are pre-tested and both are post-tested, but the ultimate difference between them is the experimental group receives a treatment. This is the most common of the pretest-posttest designs because it ensures internal validity for the experiment (Cozby 2007). The strength of internal validity emerges from the pre-test, which is administered to ensure that groups are equivalent and any confounding variables were filtered out. One of the major problems of this design is external validity is sacrificed. It is almost impossible to judge whether the pre-testing is actually a baseline measurement against groups that remained completely untreated. Furthermore, it is unethical and hard to isolate both groups completely especially if they attend the same school, because students mix outside classrooms and sometimes they share ideas related to their classes, and hence can contaminate the results (Shuttleworth 2009).

7.1 Research Site

The study was conducted in a Middle-Eastern college located in the Gulf region. At the time of the study, the college had over 2500 students and the medium of instruction is English in all its departments. Studying at the College consists of several stages. The first stage is the Foundation Program where students study English language, Keyboard skills, and Pre-Algebra. After successful completion of the Foundation Program, students can join one of the Academic Departments, which offer the Certificate, Diploma, and Higher Diploma Levels in various specializations.

7.2 Participants

Participants of the study were a random selection of Freshman students enrolled in pre-intermediate grammar core classes in the Foundation Program. Ages of participants ranged from 17 to 25, all of them were from the same ethnic background, and all but two participants were females, thus resulting in the two groups being fairly homogeneous. Two classes participated and each class had 27 students so the total student population was 54 students.

7.3 Instrumentation

7.3.1 Pretests and posttests

The pretest was the same as the posttest and they were given at the beginning and at the end of the semester. The pre-test served as the baseline measure of both control and experimental groups of students' English grammar. Students were not informed that the pretest was the same as the posttest. The test included 8 parts and the total mark was 100. Part I was assigned 8 marks and asked students to fill in blanks with singular and plural nouns for 8 sentences. Part II was assigned 8 marks and aimed at testing students' abilities to use possessive nouns and pronouns including 8 conversations. Part III was 10 marks and tested their abilities to use prepositions in order to complete 10 sentences. Part IV was 10 marks and asked students to rewrite sentences with the correct forms of verbs given in 10 sentences. Part V was 24 marks and tested students' abilities in using object and subject pronouns in 8 sentences, part VI was 10 marks and tested their demonstrative pronouns in 10 sentences. P art VII was 10 marks and tested their understanding of the verb to Be and their abilities to use them in 10 sentences and be aware of subject-verb agreement. The last part (VIII) was 20 marks and tested them in using definite and indefinite articles in English in two conversational sections with 20 spaces.

7.3.2 Student survey

I used one survey for the control and experimental classes. The first 11 items on the survey were identical for both classes; an additional item regarding technology use preferences (12) was included for the experimental class, as they experienced the effect of it in teaching and learning. The survey was named *Educational Technology Survey* and was a combination of items taken from two surveys; the *2005 Educational Technology Survey for students from University of Washington*, and *the 2009 Campus-wide Evaluation of Student Experiences with Educational Technology from University of Minnesota*. The survey utilized a 5-point Likert scale for items 5 and 6 survey and a 4-point Likert scale for items 10 and 12. Remaining items on the survey were either demographics, required a yes/no response, or asked respondents to rank order preferences from a list.

7.3.3 Grammar interactive software

Fundamentals of English Grammar Interactive software allowed students to study grammar through a dynamic combination of animation, audio, and voice recordings. Each multimedia program included in the software provided more than 100 hours of instruction and interactive practice. These multimedia programs mirrored the syllabus of the textbooks and provided extensive grammar practice using a variety of interactive tools. They were used to combine classroom instruction with internet-assisted learning or for self-study practice and they had CD-ROMs for lab/classroom-based instruction.

7.4 Data Collection Procedures

Data collection consisted of administering the pretest at the first class session and then administering the survey and post-test at the last two class sessions of the Spring 2012 semester. At the beginning of the semester, a constructed speech that presented a brief idea about the study was given to the students in both classes. Each student received an envelope that included the pretest and the consent form. Students were asked to sign a consent form showing that they were voluntarily participating in the study. Students were informed the survey would take the whole class period (40 to 50 minutes). They were also informed that there were no right or wrong answers.

7.5 Data Analysis

Data were entered and analyzed through use of SPSS (Statistical Package for the Social Sciences). Hypothesis one was tested and analyzed through using *Repeated Measures ANOVA* (Analysis of Variance) to find out whether group type (the independent variable) had an effect on total scores of subjects (the dependent variable) through different time periods; pretest to posttest. *Analysis of Covariance* (ANCOVA) was also conducted to determine if group type had an effect on posttest scores after the covariate of pretest had been eliminated. In fact, ANCOVA is a statistical analysis used to reduce the effects of initial group differences and ensures that groups are equated on their abilities through the pretest, which was used as a covariate in ANCOVA. It is used in experimental designs to control for factors which could not be randomized (Mertler & Charles 2005). In this study, it was appropriate to use ANCOVA because I had no control over the groups' abilities before they took the pretest. Moreover, I chose Core Course and decided to integrate technology in one class and leave the other without technology integration (non-randomization).

Finally, some post-hoc t-tests were conducted to examine the interactions between group results to determine what exactly was statistically significant in the interaction. These t-tests included: Independent samples t-test comparing experimental and control at pre-test, independent samples t-test comparing experimental and control at post-test, dependent samples t-test comparing pre-post for experimental group, and dependent samples t-test comparing pre-post for control group. Hypothesis two was tested through a questionnaire administered to both groups at the end of the semester. Descriptive statistics were used to report frequencies and percentages of survey items. Hypothesis three was tested through item 12 in the experimental class questionnaire and the data were analyzed through descriptive statistics, which showed means and standard deviations of item 12 components.

8. Results

8.1 Hypothesis 1

*H0*1 "Freshman students who take Core Course using WAI will have higher test scores than those in the traditional class" was tested. Table 1 introduces descriptive statistics of the study.

Table 1

Descriptive Statistics of Pretest and Posttest According to Group Type

Group	Number	Pretest M (SD)	Posttest M (SD)
Experimental	27	24.44 (17.74)	69.19 (10.17)
Control	27	47.81 (12.57)	57.70 (14.28)
Total	54	36.13 (19.26)	63.44 (13.58)

As can be seen in Table 1, the pretest score mean was higher in the control group (47.81 > 24.44), than for the experimental group. However, the posttest score of the experimental group was higher than that of the control group (69.19 > 57.70). Also, as the study compared repeated means of the pretests and the posttests between groups through different time periods, a *Repeated Measures ANOVA* was conducted to find whether group type (the independent variable) had an effect on total scores of subjects (the dependent variable) through different time periods; pretest to posttest. The analysis showed that the effect was not statistically significant (F (df (1, 52) = 3.12, p .083) (see Table 2).

Table 2

Repeated Measures Analysis of Variance of Group Type Effect on Scores

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
PrePost	20144.68	1	20144.76	240.15	.001	.82
PrePost * Group Type	8198.89	1	8189.89	97.74	.001	.653
Group	954.08	1	954.08	3.12	.08	.06

In addition, it is worth mentioning that the study did not allow me to randomly assign subjects to groups and thus the groups were not homogeneous in their pretests, violating assumptions of randomization and homogeneity. To overcome the problems of randomization and homogeneity, an *Analysis of Covariance* (ANCOVA) was conducted to determine if group type had an effect on posttest scores eliminating the covariate of pretest (Rheinheimer & Penfield 2001). The results indicated that group type had a statistically significant effect on scores as (F (df 1, 51) = 41.21, p < .001) (see Table 3).

Table 3
Analysis of Covariance Summary of Posttests Between Groups

Source	Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Pretest	2716.13	1	2716.13	26.28	‹.001	.340
Group Type	4259.42	1	4259.42	41.21	‹.001	.447
Error	5271.57	51	103.36			

Note. R Squared = .460 (Adjusted R Squared = .439)
**$p < 0.05$

In order to examine the interactions between group results to determine what, exactly, was statistically significant in the interaction, some post-hoc t-tests were conducted. These t-tests included: Independent samples t-test comparing experimental and control at pre-test, independent samples t-test comparing experimental and control at post-test, dependent samples t-test comparing pre-post for experimental group, and dependent samples t-test comparing pre-post for control group. Table 4 and 5 below compare the means of pretest and posttest scores of both groups as independent samples. The results indicated that we can reject the null hypothesis that both samples have the same mean scores and accordingly accepted that the difference was statistically significant between the two groups.

Table 4
Independent Samples t Test Comparing Experimental and Control at Pre-test

		t	*df*	Sig. (2-tailed)
Pre-Total	Equal variances assumed	-5.585	52	‹ .001
	Equal variances not assumed	-5.585	46.85	‹ .001

*$p < 0.05$

Another independent-samples t-test compared both groups at posttest scores. The table results also rejected the null hypothesis ($t\ (df = 52) = -5.58, p < .001$).

Table 5
Independent Samples t Test Comparing Experimental and Control at Post-test

		t	*df*	Sig. (2-tailed)
Post-Total	Equal variances assumed	3.40	52	.001
	Equal variances not assumed	3.40	46.98	.001

*$p < 0.05$

On the other hand, tables 6 and 7 presented Paired-Samples T-Tests for both groups. This test can correct for the individual differences (pretest in this study) by pairing comparable participants from the experimental and control group. Table 6 shows Paired-Samples T-Test of the pretest and posttest scores for the experimental group, and Table 7 shows similarly the scores of the control group.

Table 6
Paired-Sample t Test Comparing Pre-Post Scores for Experimental Group

		t	*df*	Sig. (2-tailed)
Pair 1	Pretest – Posttest	-17.69	26	‹ .001

*$p < 0.05$

Table 7
Paired-Sample t *Test Comparing Pre-Post Scores for Control Group*

		t	*df*	Sig. (2-tailed)
Pair 1	Pretest – Posttest	-4.03	26	‹ .001

*$p < 0.05$

Finally, statistics in table 8 demonstrated the change in scores from pretest to posttest in the experimental class and how their pretest scores were a bigger leap than the control class.

Table 8

Change in Scores from Pretests to Posttests in Experimental and Control Classes

	Group Type	N	Mean	Std. Deviation
Scores Difference	Experimental	27	44.74	13.14
	Control	27	9.89	12.76

In conclusion, all the statistical tables presented previously substantiated that technology affected students' achievement in the experimental group and hence helped us to claim that there was a statistically significant effect on their scores from pretest to posttest. Freshman students who took a Core Course using WAI achieved higher test scores than those in the traditional class. So, the first hypothesis was accepted.

8.2 Hypothesis 2

*H0*2 "Freshman students who took Core Course class using WAI will report a positive preference for technology integration, and freshmen students in non-technology classes will report desire to integrate technology in their classes" was tested.

I administered the *Educational Technology Survey* to both the experimental and control groups at the end of the semester the day after the post-tests. Survey tems 7-9 and item 11 were reported in percentages and are presented in Table 9. As shown in Table 9, descriptive statistics revealed the experimental and control classes in this study reported eagerness and willingness to have technology in their classes. In fact, statistics showed that students in both control and experimental classes did not have enough laptops to follow up their studies at home as only 26% of the control group and 22% of the experimental students had personal laptops. In addition, only 30% of the control class students had access to the Internet at home whereas 52% in the experimental class had Internet access.

Reported preferences for the educational technologies to be used by their instructors were not greatly different as 93% and 85% in the experimental and control groups respectively. Both groups preferred streaming videos to be included in grammar classes. Other examples with high percentages included; email distribution lists, video conferencing, audio and video clips and computer simulations. Only 48% in the experimental class chose to have PowerPoint presentations in their class versus 82% in the control class.

Table 9

		Experimental N (%)	Control N (%)
Question 7 Ownership of Laptop		6 (22%)	7 (26%)
Question 8 Home Access to Interne		14 (52%)	8 (30%)
Question 9 Preference for Instructor Use of Educational Technologies			
	Email Distribution List	25 (93%)	26 (96%)
	Instant Messaging Software (E.g., AOL, MSN)	16 (59%)	10 (37%)
	Video Conferencing	22 (82%)	27 (100%)
	Online Portfolios for Class Projects	24 (89%)	20 (74%)
	Audio/Video Clips, Animations, or Slides	24 (89%)	20 (74%)
	PowerPoint Presentation	13 (48%)	22 (82%)
	Streaming Videos	25 (93%)	23 (85%)
	Computer Simulations	27 (100%)	25 (93%)
Question 11 Student Preference for Technology			
	No Technology	-	1 (3.7%)
	Small Amount of Technology	2 (7%)	-
	Moderate Amount of Technology	4 (15%)	3 (11.1%)
	Large Amount of Technology	16 (59%)	15 (55.6%)
	Exclusive Use of Technology	5 (19%)	8 (29.6%)

Frequencies and Percentages of Laptops Ownership, Home Access to Internet, Preference for Instructor Use of Educational Technologies and Student Preference for Technology between Control and Experimental Groups

Furthermore, the majority of students in both classes preferred to have large amount of technology in their classes as the percentage in the experimental class was 59% and 55.6% in the control class. This showed a great interest with technology in the control class if we consider that almost 30% of them desired to have technology exclusively as a teaching method in their class, which was a higher percentage than the experimental group.

The survey utilized a 5-point Likert-type scale (0-4) for items 5 and 6 and a 4-point (0-3) Likert-type scale for item 10. The results of items 5, 6, and 10 are reported on Table 10. Both classes reported almost equal computer expertise and the same ability to apply computer for different purposes as shown in Table 10. It was apparently due to the lack of diversity. Big differences were found in items like the ability of setting up personal computers, as the experimental class students reported possessing greater abilities (2.9>1.1). On the other hand, the control class reported greater abilities of using computer for communication purposes and using a database system to access information as 2.9>2.4 and 1.5>0.33 indicated respectively.

Results in Table 10 indicated that students in both classes wished to have online documents and teaching materials for their classes. Experimental class students preferred to have online lecture notes, video archives of lectures, exercises, web logs, simulations, archived materials, areas to share files, quizzes and means to provide anonymous feedback to instructors. They indicated that video recordings of lectures (mean= 2.52) help them retrieve classes and refer to them as needed. They also enable them to get their assignments done especially when exercises (mean= 2.7) and visualizations (2.63) are available online.

Table 10
Means and Standard Deviations of Computer Expertise, Assessment of Current Computer Abilities and Importance of Online Materials between Control and Experimental Groups

		Experimental M (SD)	Control M (SD)
Question 5 Current Computer Ability		2.3 (0.95)	2.3 (0.53)
Question 6 Assessment of Current Ability			
	Setting Up a Personal Computer	2.9 (1.2)	1.1 (0.93)
	Connecting a Computer to a Network	2.2 (1.5)	2.4 (1.3)
	Making Decisions About Buying Hardware/Software	2.1 (1.11)	2.8 (1.22)
	Creating a Website	1 (1.1)	1.2 (1.1)
	Using Basic Operating System Features	2.4 (1)	2.4 (1.2)
	Using a Word-Processor to Create Documents	2.3 (1.04)	2.4 (1.1)
	Using Graphics or Art Packages to Create Illustrations, Slides or Images	1.9 (1.2)	2.0 (1.1)
	Using an Audio/Video Package to Create presentations	2.2 (1.31)	2.5 (1.01)
	Using a Computer to Find Scholarly Information Resources	2.63 (1.3)	2.96 (1.3)
	Critically Evaluate Information from the Internet and Other Sources	1.9 (0.91)	1.8 (1.04)
	Using a Computer to Communicate With Others	2.41 (1.42)	2.9 (1.15)
	Using a Spreadsheet for Computations and to Create Charts and Graphs	1.7 (0.9)	2.04 (1.4)
	Using a Database System to Set Up and Access Information	0.33 (0.83)	1.5 (1.5)
	Using Instructional Materials to Learn How to Use New Applications or Features	2.7 (0.99)	2.3 (1.2)
Question 10 Importance of Online Materials			
	Course Syllabi	1.63 (0.8)	1.8 (1.2)
	Lecture Notes	2.4 (0.7)	1.96 (1.1)
	Video Archives of Lectures	2.52 (0.75)	1.93 (0.9)
	Problem Sets or Exercises	2.7 (0.5)	2.04 (0.8)
	Class Discussion Boards	1.9 (0.99)	1.93 (1.04)
	Class Web Logs	2.3 (0.83)	2.1 (0.7)
	Simulations or Visualizations	2.63 (0.69)	2.0 (0.73)
	Links to Discipline-Related Sites	1.9 (1.1)	1.9 (1.03)
	Course Reserves and Archived Materials	2.2 (0.83)	2.15 (0.95)
	Area to Share Files	2.5 (0.6)	2.1 (0.9)
	Opportunity to Get Feedback from Classmates	0.6 (0.97)	1.3 (1.11)
	Quizzes or Surveys	2.4 (1.11)	1.9 (0.9)
	Means to Provide Anonymous Feedback to Your Instructor	2.15 (1.1)	2.5 (0.64)
	Links to Departmental Research Opportunities	1.1 (1.2)	1.7 (1.20)

The control group seemed to agree with the experimental group on the importance of having online quizzes, assignments, exercises and means to provide anonymous feedback about materials given to their instructors. In addition, they also considered having web logs and online simulations significant to their teaching. After all, students in the experimental class reported positive preference for technology integration in their class, and students in the control class reported a great desire to have technology integrated in their class. The two aforementioned observations substantiated the second hypothesis of this research.

8.3 Hypothesis 3

*H0*3 "Freshman students will report positive attitudes toward the use of WAI in their Level 1 Core Course" was tested through item 12 in the technology class survey and was given to the experimental group only. Table 11 shows means and standard deviations of the role of technology and its effect on their attitudes. The item utilized a 4-point (0-3) Likert-type scale.

Table 11 shows the highest mean (2.7) was that the instructor used educational technology and its applications effectively in their class. The second highest four mean scores which were recorded to have equal means (2.4) were: advantages of using WAI outweighed its disadvantages, online library resources helped them succeed in coursework, WAI helped them control their learning experiences and WAI enabled them to have a better portfolio to show to their future employers as an advantage and a qualification to get jobs.

Table 11

Mean and Standard Deviation of the Role of WAI on Experimental Class Students

Role of Technology	Mean (SD)
(a) Most of the educational technologies available to me in this class have been easy to learn	1.89 (.93)
(b) Educational technology has helped me to interact with my class instructor	2.00 (.88)
(c) Educational technology in my class has resulted in prompt feedback from my instructor	2.22 (.64)
(d) Educational technology in my class has helped me ask for clarification when information did not make sense to me	2.26 (.66)
(e) Educational technology has made it easier to work with other students in the class	2.07 (.73)
(f) I will have a better portfolio to show future employers as a result of using educational technology in my class	2.37 (.69)
(g) The educational technology I have used in this class will be useful in my future career	2.30 (.82)
(h) Educational technology has made it easier for me to see how the ideas I learning class apply to real life	2.22 (.58)
(i) Educational technology in my class has helped me produce one or more versions of an assignment before the final product	1.93 (.62)
(j) Educational technology has helped me to complete assignments for my class on time	1.70 (.82)
(k) Educational technology in my class has helped me be more efficient with my study time	2.04 (.65)
(l) I was more engaged in this class that used educational technology	2.22 (.58)
(m) Educational technology has made me feel like I have control over my learning experience in this class (e.g., through increased choices of topics, flexibility in accessing instruction or materials, etc.)	2.37 (.63)
(n) Because of educational technology, the teaching in my Core Course class was more student-centered (i.e. involved me actively in the learning process)	2.11 (.90)
(o) Because of educational technology in my Core Course classes, my instructor demanded more work from students	.81 (1.00)
(p) Because of educational technology in this class, my instructor demanded higher quality work from students	1.07 (1.07)
(q) Educational technology has helped me to learn using my preferred learning style in the class	2.04 (.81)
(r) Online library resources and services have helped me succeed in my class coursework	2.37 (.56)
(s) In general, educational technology in this class has helped me to succeed in my coursework	2.30 (.78)
(t) The instructor in this class used educational technology effectively	2.70 (.54)
(u) The advantages gained by using educational technologies in this class outweighed the disadvantages	2.37 (.69)

The lowest mean score (.81) students recorded in their answers was that they did not agree their teacher asked for more homework as WAI was implemented (which is positive in nature). They thought that responding to online resources and interacting with questions helped them reduce the amount of homework. They also agreed that implementing WAI did not require them to provide higher quality work to their teacher as the mean score observed was (1.1). In conclusion, all the statistical tables presented previously substantiated that WAI class students showed positive attitudes toward the use of technology as 24 out of the 26 items were around 2 mean score. Freshman students who took the Core Course using WAI demonstrated positive attitudes toward educational technology. So, the third hypothesis was accepted.

9. Discussion of Findings, Implications, and Future Research

9.1 Discussion of Hypothesis I Results

In the first analysis, which was conducted to find out whether there was a statistical significant difference between the scores of the two groups, the results showed that the control group students scored higher marks (mean= 47.81) than the experimental class students (24.44) and it was found that the variation of scores within the control group (SD= 12.57) was less than the other class. After the experiment had been conducted, the results demonstrated the effectiveness of WAI, as the posttest scores of the experimental class were higher than the control class students (69.19 > 57.70) and their scores became more homogeneous and closer than before (SD= 10.17). Accordingly, it can be inferred that using web resources and technology devices in teaching grammar increased the performance and the academic attainment of students as the scores started lower but ended higher than the other class. In other words, the degree of improvement by using technology is higher than without it.

The analyses proceeded to compare repeated means of the pretests and the posttests and investigate whether being in a certain group affected mean scores through different time periods. For that purpose, a *Repeated Measures ANOVA* test was conducted and the results showed that group type does not affect scores (*p*. 083 > *p*. 0.05). Actually, the research design violated two assumptions of the aforementioned test; randomization and homogeneity. Consequently, the analyses required another test to overcome the violations, i.e., ANCOVA (Analysis of Covariance). This test overcomes the problems of randomization and homogeneity and it also eliminates the covariate of the pretest, i.e., differences of pretests between groups by establishing a common baseline for all scores in both groups. It was found that group type affected scores and being in the experimental group is more advantageous to improve achievement (*p*. ‹.001), which consolidated the first hypothesis of this research.

Finally, the independent samples *t* test comparing the changes in scores between groups was an indication of the big advancement that took place in the experimental class and which was achieved primarily by the implementation of technology. The roles of instructors to advance the level of students might not lead to these huge improvements because teachers in both classes were having the same degrees and almost the same teaching experience. Additionally, both sat together and agreed to follow the same curriculum in the same speed since both were requested to cover certain topics for the final exams. In conclusion, the statistical tables substantiated that technology affected students' achievement in the experimental group and that group type affected scores. In conclusion, the first hypothesis was accepted.

9.2 Discussion of Hypothesis 2 Results

The second part of the analyses tested whether the experimental class reported a positive preference to WAI and whether the control class reported a desire to integrate WAI in their class – which was the second hypothesis. An 11-item questionnaire was distributed to test the hypothesis. Question 11 asked students to rate their overall preference for technology and both experimental and control groups reported desiring a preference for a large amount or exclusive use of technology. For their preference to the amount of technology used in the class, NONE of the experimental class students wished to have NO technology in the class, which demonstrated the big desire to have it in the class. Moreover, students were logical in their preference when they scored 59% for the large amount of technology use and 19% for its exclusive use. This high percentage (78%) meant that they preferred technology to have the big part of the class but not the whole class. The remaining 22% demonstrated little interest of having technology.

Questions 6 and 7 asked students to indicate whether they had a personal laptop and access to the Internet at home, respectively. All preferences for technology use are tempered from very few students having personal laptops or Internet access at home. Students who expressed a preference for less technology likely lacked basic skills of handling computer applications and they did not have laptops or Internet access at home. For that observation, it was preferable at the very beginning to get them into training orientation sessions in order to assimilate them with other students.

In other words, students with weak computer abilities showed some degree of *technophobia* and the teacher noticed them always in the back rows of the class. In the future, it might be a good idea to train them before showing any technology and give them some tasks to be performed in their free times in labs. If so, the degree of technophobia will decrease and they will become more interactive in their classes. On the other hand, more than half of the students in the control group wished for a large amount of technology in their class. I observed the control group students mixed with technology students who told them about their class structure and how they enjoyed it. Accordingly, students in the control class were very excited to have the same class as almost 85% reported to prefer large to exclusive amount of technology in their class.

Question 9 asked students to indicate their preference for particular forms of technology. Differences as well as similarities were noted, however, in the responses between the control and experimental group on which forms of technology they preferred. The experimental group identified their preferences after having taken a class that used technology whereas the control group preferences are based on what they would like to have in their class. Students were asked to rate their preference for use of an email distribution list, instant messaging software (E.g., AOL, MSN), videoconferencing, online portfolios for class projects, audio/video clips, animations or slides, PowerPoint presentation, streaming videos, and computer simulations. Except video conferencing, each of these technologies was used in teaching the experimental class.

9.2.1 Email distribution list

There was high preference for use of an email distribution list, as indicated by 25 and 26 out of 27 students in experimental and control classes respectively. Students used free web programs such as WhatsApp and Facebook to exchange messages after creating groups at no cost, which constituted an email distribution list because it was possible to send an email or an assignment to be seen by all list members. Actually, I observed students in both classes being very excited to apply their technological expertise into their learning and that required teachers and administrators to understand the great desire of students to get their world connected to their education.

In fact, teachers might set up a Facebook page for a course subject (for example; writing) and post a paragraph to ask students to comment on the mistakes and recommend corrections. This interactive way of teaching serves many purposes including; ease of use, acceptance by the majority, and motivation and connection to real interests. A student might post his paragraph in the WhatsApp mobile application and let others from his class comment and send suggestions. This peer learning is very effective in education as it improves the sense of leadership between students and supports them to be cooperative more than competitive.

9.2.2 Instant messaging software

The second lowest percentage of preference to technology (59%) in the experimental class and the lowest in the control class (37%) was given to instant messaging software like AOL and MSN. Both percentages indicated that this kind of contacting others has become obsolete as students relied more on Facebook and their cell phone free applications like WhatsApp and Viber. This fact interpreted the low percentage of responses to emails sent by teachers to students in the college, as part of their assessment was to see how they responded to assignments sent to their college email accounts.

The software used for messaging was similar to traditional instant messaging software and was called *Moodle*. Moodle was recommended by the college Dean and decision makers in the college as an interactive tool to send and receive assignments between students and teachers, but it failed to achieve this purpose and recorded very low interest by teachers and a big aloofness by students. Students considered Moodle a traditional and complicated method to contact teachers because it required them to be physically present in computer labs and to follow several steps in order to get their assignments done, along with the technical problems, which they did not know how to manage.

In other words, the results, which showed low interest in instant messaging software like MSN and Moodle, pointed out that administrators should find another way of communication between teachers and students that better facilitates the exchange of information between them and which lines with their interests (WhatsApp and Facebook, if possible).

9.2.3 Video conferencing

In the control class, ALL students desired to have video conferencing in their classroom, which was higher than 82% in the experimental class. I can speculate that students in the control group believed video conferencing might give them more opportunity to improve their communication and establish more relationships with other people from other nations. It also might reduce travel expenses of their trips to the college especially if the college is far from where they live. I predict that video conferencing might improve students' effectiveness, because a live video and a picture are more effective than a traditional lecture or an oral description of things. For example, expected-to-be-engineer students in the control class found it more practical and useful to show a product problem to a vendor by seeing this through video conferencing rather than having it demonstrated by a lecture. In fact, control class students reported a higher preference for video conferencing because – I think – they wanted to try it as a new educational technology, but the experimental class who scored lower (82%) showed fear and reticence to video conferencing - which was not used in their class - because they did not possess enough speaking skills to converse with foreigners. So, they wanted their technology to be restricted inside the classroom. Evidently, demonstrating high preference (93%) to YouTube streaming videos - which did not include conversation - emphasized the aforementioned fact.

It is possible that control class students favored distance learning over physical attendance as the first saved their trips and allowed them to transform their learning from its traditional structure to technological and more interesting formation. So, it is a good idea that teachers include one video conference class - or more if possible -

in every semester.

9.2.4 PowerPoint presentations

The experimental class was not very enthusiastic about PowerPoint presentations, as less than half of them preferred to have them used in class. I wonder if students in the experimental class preferred the slide shows to be shorter (from 5 to 7) and I noted they responded better when the slide show was accompanied by music or animations. These students might have felt that lecturing through slides was almost traditional and just another form of lecture, but instead of having information written, they had them visible. In sum, students preferred to have just one idea on each slide and almost one vivid picture or video with bright colors between every two slides. Also, they liked it when their teacher was simple in his presentation and when they were asked to think loudly and read behind lines. After all, they thought that it all should be FUN.

9.2.5 Streaming videos

Experimental class students demonstrated a great preference for streaming videos as 25 out of 27 students desired to have it always in the class. In fact, the streaming videos used by me were lectures given by native speakers of English who explained the same topics that were explained before by the teacher. The videos were usually a combination of lecturing, singing, and real life applications of topics previously being discussed by the teacher. Students liked them because they strengthened the links between abstract ideas and practical applications and allowed them to travel to remote places without leaving their classroom. In addition, they enabled them to interact and engage with subjects and also retain concepts after visualizing them.

I also noted that students were very interested in the part of the video they felt more comfortable with. For example, some of them showed interest with motion, others with images or sounds which indicated that the complementary nature of videos – as part of educational technology – fulfills the diverse learning styles and individual needs of students which were referred to in the problem of this research. Consequently, teachers might take it into consideration to include several forms of technology in their teaching videos to better serve different learning styles and multiple intelligences in their classrooms.

9.2.6 Computer simulations

Another observation was that ALL experimental class students would like to have simulations in their class. They stated to their teacher that computer simulations allowed them to check their understanding of the real world by modeling the lesson structure into real life situations. They held that simulations facilitated "interactive practice" of real-world skills and engaged them in interaction by helping them to predict the course and results of certain actions. Simulations, as they said, enabled them to understand why events occur and how, it also allowed them to evaluate ideas, gain insight and finally they stimulated their critical thinking.

9.2.7 Assessment of computer ability

Survey question 5 asked students to assess their overall computer ability and question 6 asked students to rate themselves along 14 dimensions of computer use. The experimental class students had little experience utilizing computers for their studies. They scored higher than control class in setting up their personal computers, critically evaluate information from the Internet and other sources, and using instructional materials to learn how to use new applications or features. What was observed from their answers was the low mean connected to the ability of using graphics or art packages to create illustrations, slides or images which might be connected to their low preference for PowerPoint presentations in their classroom.

Students might believe some of the features of computer use are quite complicated and even simple features require some getting used to them. Also, when the teacher was presenting the Power Point, students observed how their teacher was very dependent on the computer as he needed to keep clicking the mouse or pressing a button to advance the slides in the presentation, which means that a presenter should possess the basic requirements of working with computers. As a result and how things might be connected, students in the experimental class lacked the basics of using the simple operating system features which perhaps made them less favorable toward PowerPoint presentations as they might be asked one day to do one in the class in front of their colleagues. Accordingly, students should be given training sessions on how to use computers for their classes and get some more additional lab classes in order to apply what they trained on practical implementation.

9.2.8 Importance of online materials

Survey question 10 asked students to rate their preference for and use of 15 online materials, including course syllabi, lecture notes, class discussion boards and blogs, and so forth. With regard to course syllabus and its possibility to be online as an assisting tool for classes, students in both classes did not appreciate the role of or understand the purpose of course syllabi with the experimental class rated an even lower mean of 1.6. I considered that the mismatch between classes' modules and the syllabus focus points was the main reason for not paying attention to syllabus during the study time. Students were mostly surprised when they were tested that there were sudden changes in the syllabus without them being informed. Moreover, not all teachers highlighted the importance of syllabi and how they help students follow their progress and also there were not an effective and continuous leadership to evaluate the scope application of syllabi in classrooms.

Consequently, I recommended college administrators to emphasize the importance of course syllabus and ask teachers to give orientation classes at the beginning of every semester and possibly discussing syllabus items with the students to get their feedback on its structure and if there are any suggestions they might ask for. Going back to the research problem, it was mentioned that students in any class had different learning styles and multiple intelligences and that they learn differently according to the way that best suits their abilities. It was also mentioned that educators were very keen to give every student a chance to learn and engage in the educational setting. Consequently, responses to question 10 items reflected this fact. In other words, students scored high means for online lecture notes (*verbal/ linguistic learning style*), online video archives of lectures (*visual and auditory learners*), online simulations or visualizations (*Tactile/ Kinesthetic Learners*), online areas to share files (*interpersonal intelligence*). These materials scored 2.4, 2.5, 2.6, and 2.5 respectively, which is relatively high on a 3-point scale.

I felt satisfied with these outcomes because the study suggests that teachers can utilize web-assisted instruction as a solution for the research problem and WAI might help educators respond to different learning styles in classrooms. The variety of scores emphasized the point of having different mentalities and methods of learning in one class and that it was unfair to treat, teach, and assess them the same. As mentioned before, WAI had the benefit of presenting the study content in hypertext formats to allow students to create a sequence of investigating the content on his/her volition. This colossal shift from one area to another related one enables students to control their learning (Jonassen *et al.* 1996). WAI also developed the values of student individualization and voice. It enabled students to determine their content, time, resources, feedback, and a multiple variety of media to meet their learning needs (Relan and Gillani 1997).

What was surprising to me was the lowest score of the opportunity for students to get feedback from classmates, which just recorded a mean of 0.6. To my understanding, Omani students were not used to constructive criticism by other classmates due to a variety of reasons including; the lack of diversity in their community, their misunderstanding of constructive criticism, and the problem of self-image or esteem in front of others. First, all classes are homogeneous in the level of English they enrolled in (level 1) and all are Omani students, so they considered it unacceptable to be criticized by a classmate who shared the same educational background. Second, students also might not know actually how to criticize others without involving their feelings, which make the critique negative, and finally, the trouble with constructive criticism is that not all students are receptive to it and they feel either their self-esteem being shrank or the criticism is negative.

Web-assisted instruction has been suggested to enhance *student self-esteem*. The increased competence Omani students will feel after mastering technology-based tasks and their awareness of the importance and value placed upon technology within the culture of their college, might lead to increase in students' sense of self worth (Cotten 2008). Evidently, students will take pride in being able to employ the same technological devices and computer-based tools used by their teachers. They will gain the sense of empowerment behind the ability of learning to control a computer and use it in ways associated with the real world. More importantly, since technology is valued in the college, giving students and allowing them to employ computers in their classes means that educators give weight to their college activities and hence tell them a sensitive message that their work is totally important and appreciated.

The last two points worth mentioning in question 10 were the high percentages of the importance of the availability of online problem sets or exercises (mean= 2.7) and quizzes (2.4). These high means were recorded in both groups. In the experimental group, one can understand that students preferred to check their understanding and apply their technology skills on other problem sets and assignments. Being able to do so gives them more credibility towards WAI and increases their self-worth. In addition, quizzes are often used as an incentive for students to follow their material between exams and provide them with valuable formative feedback on what concepts and problems they need to review (Cooper *et al*. 2007). Furthermore, exercises and quizzes enable students to assess their comprehension and identify their misconceptions.

One of the highest scores in the control group students was their preference for class web logs (mean= 2.1). This online device was also recorded high in the experimental class (2.3). Web logs are ways for transferring the usual classroom activities to cyberspace. A blog is a website where entries are displayed in a reverse chronological order. According to students' viewpoints in both classes, web logs substituted traditional education for autonomous learning and enabled them to share their results with others. They also were helpful for learning intuitively, individually, and collaboratively (Lujan-Mora & de Juana-Espinosa 2007). Web logs supported group learning and created a way for students to monitor their own learning. Students preferred them because they were easy to setup in contrast with other technologies, and they allowed publishing with just one click, which made them easy to create. Moreover, web logs had the ability to reach larger audience with different educational levels and to transform education outside the classroom. This characteristic of addressing larger audience encouraged critical thinking and sharing ideas from diverse opinions and interests.

I concluded that web logs were very similar to WhatsApp application and this similarity explained their interest with web logs. To put it differently, I might infer that educational technologies should be related to students' interests in order to render them successful. Moodle failed because it was similar to obsolete instant messaging, but web logs were preferred and succeeded because they were similar to WhatsApp. As a result, one can predict the success or failure of educational technologies employed in classrooms according to this inference. Stemler (1997) emphasized that educational technology should touch a target and the learner should be given access to elaborative or tangential material, permitting learners to apply their technological interests and applications in order to construct their learning experience.

9.3 Discussion of Hypothesis 3 Results

Finally, the third hypothesis was tested to find out if WAI had a positive effect on students' attitudes. The analysis utilized item 12 in the questionnaire, which was just designed for the experimental group. Question 12 consisted of 21 items asking students in the experimental class to rate their attitudes toward the technology used in the class.

Referring back to the results of table 10, the highest score observed was students' belief that the instructor used educational technology effectively (mean= 2.7). A growing body of evidence suggested that teachers played key roles in determining how well educational technologies are used effectively in classrooms, and thus the degree to which technologies improved student achievement (Gooler *et. al*. 2000). The NETS-T (*National Educational Technology Standards for Teachers*) standards, especially when aligned with the *Interstate New Teacher Assessment and Support Consortium* (INTASC) standards, is at the heart of this higher-education reform movement and is generating heightened awareness and understanding of the significance and content of teacher standards in general and technology-integration competencies in particular.

In examining students' responses, I felt that students were comfortable with technology if they saw their teacher was using it effectively. Students became more active instead of passive because they were able to control their learning as they discovered that their teacher also controlled his/ her class. They got encouragement to learn and acquire knowledge from the confidence generated by teacher's competence of using educational technology. In other words, effectively managing classrooms educational technology activities by the teacher requires a teacher with sound expertise of technology which helped students to meet their needs and equip them with appropriate skills for the future (Gooler *et. al.* 2000).

The second highest mean score (2.4) was recorded for the importance of educational mastering technology, which helped students to show their future employers promising portfolios. It was apparent in the class that students gained more confidence and self-worth behind the increasing ability of using different technology applications and implement them in their class subjects. As a result, they felt they were more qualified than before and were ready to make decisions and show their future employers what forms of technology and skills they learned in their classrooms. Strauss and Frost (1999) stated that educational technology tools enhance learning and provide students with the needs and skills necessary for their future careers.

The first two highest scores were so far consistent with the requirements of successful integration of technology as research highlighted the importance of teachers' efficiency and the objective behind using technology in classroom settings. The next highest responses were that educational technology helped students to ask for clarification when information did not make sense to them, which resulted in prompt feedback from the instructor. In addition, educational technology made it easier for students to see how ideas apply to real life and how technology helped them engage in class discussions.

Using technology in the class including songs and games created an informal atmosphere between the teacher and his students. Consequently, students interacted with all songs, games, and simulations by standing and clapping or even singing with the teacher. This informality established a family-type classroom between all members in the class and the result was that if a student did not understand an idea, he/ she would not be shy or embarrassed to ask for more clarification. In other words, educational technology established friendship between the teacher and his students. In one situation, a student asked me "*Teacher! Would you please play the song again? I want to dance.*"

Another advantage of educational technology recorded high was that it shifted education to be more student-centric and students were involved actively in the learning process. In order to emphasize this outcome, I would like to describe a typical class session. The class usually started with a short PowerPoint presentation, which stimulated students to react and answer questions and exercises without the teacher being the big talker. Next, a song was played to clarify the points and new ideas included in the slides for which the teacher just asked one question and allowed students to listen and respond to song questions. Then, the teacher displayed grammatical simulations by just clicking "play" and asked students to respond verbally to questions asked by online speakers. After that, students indulged in online games or sometimes class games, which aimed at checking their understanding for the class subjects. Finally, students were given online reference materials to consolidate what had been explained and which enabled them to answer and get feedback for their wrong answers.

From the class structure shown above, it was noted the class with educational technology became more student-centric and the teacher talked very little and worked as a facilitator for activities. "Technology can be designed to provide adaptive learning and assessment experiences for students. Most important to student-centered learning, technology can enable outcomes that vary based on student strengths, interests, and previous performance" (Moeller & Reitzes 2011, p.7). Apparently, educational technology changed the roles for both students and teacher. Students became more responsible learners and worked to develop their unique academic interests, and to professionally produce authentic and quality work which demonstrated their learning.

Additionally, two important high scores for the role of educational technology were its effect to make it easier for teamwork and the availability of different teaching styles from which students can pick a style that best matched their learning styles. In the class, I observed that students were asking each other about the information being given and they did not refer to the teacher for their answers. It was due to the nature of informality and the ease of communication between students. Moreover, students showed different interests in class materials and different teaching styles as they paid attention to one style and focused on its content more than others. For example, some students demonstrated an interest with video illustrations being presented by native speakers because they could ask their teacher to stop the video and rewind it or play it again. Other students emphasized PowerPoint slides more, which enabled them to attach pictures with words and which helped them memorize more efficiently.

After all, a one-size-fits-all principle does not align with educational technology because the latter makes it available for students to learn according to their preferred learning style and allows them to engage more actively with the teacher and with other classmates. Educational technology seems to fulfill the needs of multiple intelligences in classrooms and encourage decision makers to take more actions to improve the educational settings.

10. Results of Study and Disruptive Innovation Theory

Results of the study were in line with the theory which was used to interpret them. First, it was mentioned in the discussion of the principles of *Disruptive Innovations Theory* that initially WAI might be not as good as traditional system of teaching since its beginning may face problems of resistance and rejection, but it extends its benefits to students who, for one reason or another, are at risk or under achievement. Students can be compared with non-consumers in the business market. And, if this category of students (non-consumers of traditional teaching) improved, disruptive innovations become good enough to handle more students and more complicated courses until all students are engaged in its use.

In the long term, technology-infused instruction becomes the norm and lecture-based, teacher-centered traditional instruction is abandoned (C. M. Christensen & Horn 2008). In other words, smart students in traditional teaching are consumers for that kind of teaching, but low-achievement students are the non-consumers. With the aid of technolgy and web-assisted instruction, non-consumer students will improve and demonstarte more significant advancement than traditional teaching consumer students. A closer look at the pretest scores and posttest scores support this conclusion. (see Table 12).

Table 12
Degrees of Improvement Between Pretest and Posttest Scores in the Experimental Class

Pretest Scores	Posttest Scores	Degrees of Development
24	63	39
*2	61	59
24	69	45
55	81	26
24	49	25
20	64	44
27	69	42
*14	68	54
21	65	35
*9	65	56
*12	60	48
*8	62	54
*10	64	54
*9	79	70
*14	68	54
33	72	39
*1	57	56
*12	59	47
*11	66	55
*8	80	72
63	92	29
40	62	22
35	70	35
35	75	40
61	87	26
51	89	38
37	72	35

* *Pretest Lowest Achievers*

Results in table 12 indicated that the lowest scorers in the pretests (2, 14, 9, 12, 8, 10, 9, 14, 1, 12, 11, 8) – which are marked by asterisks – demonstrated the highest degrees of improvement in the class, which were (59, 54, 56, 48, 54, 54, 70, 54, 56, 47, 55, 72) respectively. Statistically, the most prominent result was the improvement from 8 (pretest) to 80 (posttest). Consistent with the theory of this research, results of table 12 indicated that web-assisted instruction provided low achievers an excellent opportunity to improve themselves and empower their abilities in a different style, which might be considered – according to their results – the best learning style available to them to advance and improve their academic excellence.

Moreover, the theory postulated that consumers of traditional teaching and who received high scores will admire the way non consumers proved themselves in an easy and simple way. It was the way that enabled low-scoring students to utilize technology aids and employ it to build more interpersonal relationships with others (Osguthorpe & Graham 2003). In other words, low-scoring students started weak academically, but ended excellent academically and socially – two values always emphasized by educators.

In the general sense of the theory, the results for question 1 of this research showed the control group students scored higher than the experimental students in the pretest. And if we assume that experimental class students were the non-consumers compared to consumer students in the control class, then analyses should indicate that experimental students scored higher in the posttest, which is what happened. Degrees of improvement between classes highlighted the effectiveness of WAI in the advancement of students' academic attainment and that achievement by using technology is higher than without it.

Furthermore, the theory supposed that disruptive innovations may cause some kind of initial turbulence to any established institution, but later changes become more assimilated to the system. It proposed that innovations might start from the low end and compete with the non-consumption (low achievement students in this situation). They start slowly and improve gradually until recognized by a large group of students and administrators. In evidence, I faced many barriers conducting his research due to a variety of reasons. Administrators were concerned that WAI might disrupt a system that has been established for decades and feared the comparisons that might take place between teachers' styles. They were afraid the WAI classes deviated from the course content and delivery plans assigned for level 1 students; especially given the fact that final exams were common for all sections.

After WAI was applied and mid and final exams were conducted, WAI classes were externally around the range with other classes in their improvement. In addition, I made a presentation about "*WAI as a Tool for Achieving Differentiated Instruction"* in March 2012 for the college's administrators and instructors. The presentation was an excellent opportunity for me to highlight the advantages of WAI on students' learning and what the structure of classes was. Administrators and other teachers were interested and the degree of fear was relieved. Then, I discovered that the centre Head had ordered technicians to install ceiling-mounted data projectors in 20 classes out of 40 classes. After that, he recommended all teachers to employ technology in their classes using the multimedia tools available with technicians.

The above-mentioned changes demonstrated in a way that people started adopting WAI but indirectly and without referring to others the actual reasons behind these changes. In fact, Green and Gilbert (1995) in their *Implementation Cycle* research, ranked this stage as the first stage (stage 0) which starts with some planning, investigation, whether the new technology helps doing the work better and faster, and experimentation. In another study, Rogers (1983) proposed five categories that contribute to the scenario of technology integration. The situation in my study was an example of the first stage when people were willing to accept and experience the new technology (the innovators) who make up 3% of faculty, and the second stage when the early adopters who are the first risk takers come and make up 10% of faculty. The changes proposed that WAI started integrating into the system indirectly with taking for granted that traditional teaching remained the main medium of instruction, which is constant with theory postulation.

Finally, the theory assumed that WAI improved the delivery of self-paced learning and the individual discovery of knowledge. It also concentrated on the importance of technology to create a spirit of teamwork and the ccoperative contribution to learning outcomes. It asserted that WAI was a method to individualize learning and address multiple intelligences in the class. Actually, responses to hypotheses 2 and 3 emphasized these postulations. Students showed a great willingness to integrate technology in their class as it guaranteed the achievement of all aforementioned skills.

11. Conclusion

The purpose of this quantitative study was to investigate the effectiveness of technology integration (namely, web-assisted instruction) on students' achievement and attitudes in a Middle Eastern college. It was also the purpose of the study to examine whether WAI disrupted traditional teaching and encouraged educators to integrate it as a powerful means of instruction. The main focus of the study was to propose WAI as a solution to address the diverse learning styles in the class. Christensen's *disruptive innovation* theory was used as the theoretical framework to investigate if WAI was disruptive to teaching methodologies and the way educators and administrators perceive innovations. The research design was *the pretest – posttest control group design* and the study was conducted in an Omani governmental college. The participants were 54 students from level 1 foundation English distributed in two classes; experimental and control. Both classes were pre-tested and post-tested at the beginning and both were given a survey at the end of the fall semester 2011. Findings of the study substantiated the theory and revealed that freshman students who took a Core Course using WAI achieved higher test scores than those in the traditional class. It was also found that students in the experimental class reported positive preference and attitudes for technology integration in their class, and students in the control class reported a great desire to have technology integrated in their class. But, at the time of the study I was not able to determine initially whether WAI was disruptive or not, because it might not be apparent whether an innovation is disruptive until long after it had been implemented. In other words, the analysis of disruptive innovations is one of the big challenges for the theory because the focus on which we judge is the impact on learning outcomes (Oslo Manual 2005). The disruptive nature of WAI can be inferred at least after one year passed since the beginning of its implementation.

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