

**INTERNATIONAL  
JOURNAL  
OF  
INSTRUCTIONAL  
TECHNOLOGY  
AND  
DISTANCE LEARNING**

**January 2012  
Volume 9 Number 1**

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**ISSN 1550-6908**

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Research and innovation in teaching and learning are prime topics for the *Journal of Instructional Technology and Distance Learning* (ISSN 1550-6908). The Journal was initiated in January 2004 to facilitate communication and collaboration among researchers, innovators, practitioners, and administrators of education and training involving innovative technologies and/or distance learning.

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# *International Journal of* **Instructional Technology & Distance Learning**

Vol. 9. No. 1.

ISSN 1550-6908

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## Editorial

# Technological Revolution in Education – Part 5

Donald G. Perrin

Technology is often defined as equipment and machines, but it also includes tools, techniques, systems, and methods of organization used to solve a problem, achieve a goal, or perform a specific function or set of functions. Technology is also the making, modification, usage, and knowledge of the tools and techniques listed above. It is much more than equipment and machines, although equipment and machines may be a necessary part of some technologies.

Technologies significantly affect the human species' ability to manage, control and adapt to its natural environments or leverage available opportunities for greater efficiency or gain. Often a new technology is the result of a creative or problem solving process or an innovation or paradigm shift. It can combine insight with higher levels of thinking to provide a new and unique solution to a problem.

Education, as traditionally applied, does not adequately prepare people for the future. Knowledge, skills and aptitudes are based on past history and solutions that worked in the past. This is a useful starting point, but may be less relevant when we apply it to the world of the present or the future. We should continually re-assess and re-define our objectives and priorities to fit the dynamically changing world we live in. Curriculum should focus on the present and the future, and learners should have skills to explore, define, and create solutions to problems and needs as they discover them in the future. This requires imagination, curiosity and thinking “outside the box”, the kind of higher level thinking that made the Silicon Valley famous.

For decades, educators have discussed the importance of left brain and right brain activities and their relationship to learning. Left-brain scholastic subjects focus on logical thinking, analysis, and accuracy. Right-brained subjects, on the other hand, focus on aesthetics, feeling, and creativity.

Left Brain	Right Brain
Logical	Intuitive
Sequential	Less structured
Objective	Subjective
Rational	Creative
Analytical	Synthesizing
Focus on components	Holistic

K-12 schools, confronted with budget cuts, tend to eliminate creative activities such as art and music, and activities for coordination of brain and body like physical education. Learners need to be intellectually challenged to develop the whole brain and physical coordination and strength.

Time in school needs to be more productive. Time beyond school should also be intellectually stimulating and fruitful. Television and entertainment media that lack physical exercise, intellectual participation, and feedback are like tranquilizers, causing a “narcotizing dysfunction” of mind and memory that negatively impacts learning.

It is encouraging that many children now choose computers and interactive multimedia over television, but there is still a lack of physical activity and creative opportunities to develop receptive minds and psychomotor skills, and relate what is learned in school to the world at large.

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**Editor's Note:** As we transition courses from face-to-face to online learning environments, we need to compare the various support systems available to enhance learning. Asking questions and seeking help are essential to the learning process, but the context, mechanisms, and opportunities may be different. With this in mind, the follow study was initiated.

## **Academic Help Seeking in Online and Face-to-Face Learning Environments**

**Randa A. Mahasneh, and Yahya, H. Nassar**  
Jordan

### **Abstract**

The current study compares actual help seeking frequencies across online and face-to-face learning environments. It also examines strategies enacted by nursing students when they faced academic difficulties, reasons for help seeking avoidance, and the relationship between the frequency of asking questions and achievement. Participants were nursing students enrolled in a course with two sections; online (N=25) and face-to-face (N=31). It was hypothesized that, students in the online section would ask more questions, be less concerned about social embarrassment, and report the desire for autonomy as one of the main reasons for avoiding help seeking. It was also expected that students' achievement would be significantly correlated with help seeking frequency. The results supported the above hypotheses except for the frequency of help seeking in the online section compared to the face-to-face one. Implications and directions for future research are suggested.

**Keywords:** Academic Help seeking; Online learning Environment; Online Education; Nursing; Communication Skills.

### **1. Introduction**

Modern educational systems are becoming increasingly interested in providing technology-rich learning environments. As a result, different academic institutions have established centers for information and communication technology with necessary infrastructure and learning resources to provide and support online education for students' population. The growth in utilizing online education has encouraged researchers to compare the qualities of this pedagogical method with those of traditional face-to-face delivery method (Campbell, Gibson, Hall, Richards, & Callery, 2008; Jacobsen, 2006; Ryan, Cariton & Nagia, 1999; Leasure, Davis & Thievon, 2000). A common goal among these studies was to answer the question of whether online education supports students' learning beyond the traditional face-to-face one.

Whereas students' interaction and participation in online learning environments have been well documented (Campbell, et al., 2008; Jacobsen, 2006; Lajoie & Azevedo, 2006; Ocker & Yaverbaum, 2001; Thornam & Phillips, 2001), students' use of learning strategies that reflect self-regulation, such as help seeking, is less clear (Kitsantas & Chow, 2007). Help seeking is a strategy enacts by students when they encounter academic difficulties, and entails using others as resources to acquire the necessary help (Karabenick, 1998; Ryan, Gheen, & Midgley, 1998; Ryan, Pintrich, & Midgley, 2001). Academic help seeking is an important learning strategy, because in learning settings students may come across situations in which they need help or advice in order to continue the learning task. In such situations, students are required to take responsibility in order to obtain the necessary help and to continue the learning process. Students, therefore, must be aware that they need help, decide to seek help, and approach the appropriate source to obtain the required help (Karabenick, 2003; Ryan & Pintrich, 1997; Ryan, et al., 2001).

It is crucial to examine students' use of help seeking strategies in an online learning environment given that this environment has considerable qualities which may affect students' decision to seek help (Kitsantas & Chow, 2007). These include the availability of synchronous (chat sessions and video conferencing) and asynchronous communication techniques (e-mails and discussion forums) to enhance interaction between students and their instructor and among students themselves. These communication techniques permit students to seek help or post their questions whenever they come to mind, and allow students to reflect on, compose and edit their questions before sending them to others (Campbell, et al., 2008; Jacobsen, 2006). Another characteristic of the online learning environment is the lack of social status cues such as sex, age, style and appearance that might affect students' decision to seek help compared to the traditional face-to-face learning environment. When such differences vanished in online environments, more students are expected to seek help with a lower level of perceived threat (Keefer & Karabenick, 1998). Furthermore, this environment offers opportunities for discussion channels which affect learners' comprehension monitoring processes. Specifically, when learners read others' questions or posts they would revisit their level of understanding and decide if the material is adequately comprehended or help is needed (Dede, 1996; Karabenick, 1996).

The above theoretical accounts supported the hypothesis that students in an online environment would use help seeking strategy more often than students in learning environments where a face-to-face contact is offered, such as traditional or face-to-face ones. However, such assertion did not receive adequate empirical support (Kitsantas & Chow, 2007). Therefore, the current study compares actual help seeking instances across online and face-to-face learning environments, and also examines behaviors and strategies enacted by students when they faced academic difficulties in these learning environments. According to Karabenick and Knapp (1991), students' behaviors and help seeking strategies can be classified as: 1) formal help seeking (seeking help from instructor); 2) informal help seeking (seeking help from peers); 3) instrumental activities (improving performance through extracting more effort); 4) and lowering performance aspiration (accepting missing some information). The current study followed this classification, however help seeking from formal resources was divided into two separate strategies: help seeking from formal resources overtly (in front of peers), and covertly (in private). This division was made because students' preference of one of these strategies over the other reflects various concerns and intentions. While help seeking from the instructor covertly reflects students' perception of threat and embarrassment from peers, seeking help from the instructor overtly reflects students' intention to obtain the necessary help from trustable source without threat concerns. Altogether the current study classified students' behaviors and strategies as they encounter academic difficulties into the above five categories, in addition to students' decision to avoid help seeking as a sixth strategy.

Although help seeking is an important learning strategy that found to be positively related to students' achievement (Karabenick, 1998; Kitsantas & Dabbagh, 2004), university students are found to avoid using it in traditional face-to-face classrooms (Karabenick, 2003). During the last decade, a fairly large number of studies have been conducted to examine different reasons for help avoidance among university students (Alexitch, 2002; Karabenick, 1998; Karabenick, 2003; Karabenick & Knapp, 1991; Karabenick, & Sharma, 1994; Schwalb & Sukemuni, 1998). Researchers have identified several personal and social concerns that underlie students' reluctance to seek help. First, since help seeking could be perceived as a dependent strategy, students might avoid help seeking as a desire for autonomy and self-reliance (Butler & Neuman, 1995). Second, given that students' need for help could be perceived as a proof of incompetence or lack of ability, students might avoid help seeking as it threatens their competency (Butler, 1998; Karabenick, 2003; Karabenick & Knapp, 1991; Ryan & Pintrich, 1997; Ryan, et al., 2001). Third, since help seeking includes social interaction with others, it is likely that the social climate of the learning environment influences students' decision to seek help. It has been argued that in

learning environments where students feel uncomfortable to interact with other students and their instructors, they will be more likely to avoid help seeking because of social embarrassment (Ryan, et al., 1998; Ryan & Pintrich, 1997). The current study examined reasons for help seeking avoidance in face-to-face and online learning environments including: the desire for autonomy and self-reliance, perceived threat of competency and social embarrassment. Moreover, in the current study the structure and presentation of the learning material, were also considered among factors that might affect help seeking avoidance in both learning environments. Students in an online learning environment are required to be held responsible for their learning (i.e., study time, learn the material on their own), therefore it was hypothesized that students in the online session would report the desire for autonomy as one of the main reasons for avoiding help seeking. Furthermore, because of the particular characteristics of an online learning environment, including the availability of synchronous and asynchronous communication techniques and the lack of social cues, it was hypothesized that students in the online session would be less concerned about social embarrassment in comparison with students in the face-to-face session, where a face-to-face contact is dominant.

Most studies focused on examining the relationship between the above factors and help seeking in traditional face-to-face learning environments. Although there are few studies that examined students' use of help seeking strategy in online environments (Aleven, , Stahl, Schworm, Fischer, & Wallace, 2003; Melrose, 2006), only few of them compared help seeking in different technology-mediated learning environment (Kitsantas & Chow, 2007). In addition, most previous studies collected data about students' use of help seeking strategy using self-report measures that makes the verification of this data unattainable. The current study compares help seeking behaviors among two groups of undergraduate nursing students who were enrolled in an online and a face-to-face section of a Communication Skills course. In addition, the study obtained data about actual help seeking events from both learning environments by using more objective methods such as: observational method in the face-to-face environment; and students' log files in Blackboard and content analysis of students' posted requests for help in the online learning environment. More specifically, the current study attempts to answer the following research questions:

Is there a significant difference between the means of online and face-to-face sections on help seeking frequencies?

Is there a significant relationship between students' membership to class sections (online and face-to-face) and strategies used by them when they encounter academic difficulties? And what are the most common strategies used in each section?

Is there a significant relationship between students' membership to class sections (online and face-to-face) and the reasons for help seeking avoidance?

To what extent help seeking avoidance subscales are able to predict the number of questions asked by students in each section?

Is there a significant relationship between the number of questions asked by students in both class sections and their academic achievements?

## **Method**

### ***Sample and Study Design***

In the Fall of 2009/2010, a 16-week semester, the Communication Skills course was offered as three sections, a traditional face-to-face, a hybrid and an online. This study compares the online with the traditional face-to-face section that were taught by the same instructor. Originally, the number of nursing students who were enrolled in these sections was 31 students in the face-to-

face section and 32 in the online section. However, 5 of the online students transferred to the face-to-face section and 2 dropped out the course, leaving the final sample as 31 students in the traditional section and 25 in the online section. Students' registration in the two sections was based on their schedule of other courses. Therefore, this study followed a quasi-experimental design since random assignment of students to the two sections was not possible. Approval to conduct the study was obtained from the Human Research Ethics Committee of the Hashemite University. Students were informed about the study purpose at the end of the semester before collecting the data in order not to affect their help seeking behaviours during the course. Voluntarily participation was emphasized.

### **Course Design**

Communication Skills is a 2-credit course offered for undergraduate nursing students usually in the second year of the program. This course aims at providing students with knowledge and skills to communicate effectively with clients, families, colleagues, health team members and others in the daily life. Principles of intrapersonal, interpersonal, and group communication processes are emphasized. The two sections of the course were taught by the same instructor, and had the same contents, active learning exercises, assignments and exams.

Total grade for each section of the course was divided as: 10% for participation, 10% for an individual assignment, 10% for a group assignment, 20% for the first exam, 20% for the second exam, and 30% for the final exam. Participation grade included: asking and responding to the instructor questions; reflecting on other students' questions, comments or answers; and providing and discussing related materials to classroom or the online environment.

#### *Online Course*

Blackboard Learning Management System™ (Release 6) and Tegrity Distance Education System (Tegrity Campus 2.0) were the platforms used to create and structure the online course. Tegrity system enables recording lectures by the instructor, captures all files displayed on the computer screen, and facilitates capturing supplementary materials by the use of document camera.

Blackboard was the host system for the online course. The online course was designed as modules that represent course units. Each module contained: the learning objectives, introduction about the unit topic, video session recorded using Tegrity system explaining the most important points in each lecture, references, extra links, and discussion board questions. Different synchronous and asynchronous communication techniques within Blackboard were utilized to facilitate student-student and student-instructor interaction, as well as collaboration among students themselves. These include: a) weekly discussion board forums where students were required to post answers to questions about case-scenarios; b) groups pages for students to communicate via e-mail, and post files related to their group projects; c) e-mails to communicate with other students and the instructor; and d) live-chat area. In addition, under the discussion board forum, an area was created and called "Ask Questions" for students to post any question about course contents or issues related to course enrollment.

#### *Face-to-Face Course*

The traditional course was taught as interactive face-to-face lectures.

### **Procedure**

Since this is the first distance learning course offered at our school of nursing, at the beginning of the semester students in the online course had received hand-on instructions in order to effectively use all functions within Blackboard. This include the use of synchronous and asynchronous tools in order to communicate with the instructor and other students in the class; listening to Tegrity sessions; how to post the online assignments; and how to open an e-mail

account and effectively use e-mails and other computerized applications (PowerPoint, Word documents) for educational purposes. In addition, the instructor recorded a tutorial on "Effective System Use" using Tegrity system. This tutorial included (as mentioned above) all aspects of Blackboard and Tegrity systems' use and was kept available within an introductory module as a help resource for all students throughout the course. Different methods were utilized to facilitate class participation and asking questions by the online students about the course contents, assignments, and exams. Students were encouraged to ask questions: a) at the end of each video session about the contents; b) using every-other-week posted announcements to remind students to use the "Ask Questions" function under discussion board forums and/or to send e-mails to the instructor; c) during the live-chat sessions; d) through the instructor feedback to discussion board forums where students were encouraged to read others' postings and to send comments and questions to their peers; and e) using their group pages.

On the other hand, students in the face-to-face section were also provided with hand-on instructions on how to effectively use the e-mail for communication and other computerized applications necessary to complete their assignments (such as PowerPoint and Word documents). These students were frequently encouraged to: a) ask questions either in the lecture or by sending e-mails to the instructor, and to respond to questions in class; b) bring related materials to class for discussion; c) reflect on other students' answers and provide comments; as well as by d) showing up during the instructor office hours.

In the face-to-face section, students received instant feedback to all their questions asked in class and within two days to questions asked via e-mails. Similarly, students in the online section received feedback to their posted or e-mailed questions also within two days.

At the end of the semester, questionnaires were distributed and collected from all students by an instructor who was not involved in teaching the course. Before collecting the data, students were informed about the purpose of the study and voluntary participation was emphasized. In addition, another faculty was asked to re-grade all students' assignments besides the course instructor in order to decrease bias in the final course grade (student achievement).

### ***Instrumentation***

Main end points in this study included: 1) frequency of help seeking; 2) student help seeking strategies towards academic difficulties; and 3) reasons for help seeking avoidance. In addition, the study examined the relationship between help seeking instances and student achievement.

Two instruments labelled: "*Student Strategies towards Academic Difficulty*" and "*Reasons for Help Seeking Avoidance*" were developed by the authors after extensive review of the literature and used for the purpose of the study. The two scales were mainly based on studies of help seeking strategies such as Karabenick (2003), Karabenick and Knapp (1991) and Karabenick and Sharma (1994). The two instruments went through two validation phases. The first was for content validity conducted by a panel of four experts of educational psychology, nurse educators, information technology and online education experts to rate all items for clarity and appropriateness, and to validate the comprehensiveness of the scales. The second was a face-validity conducted using 30 students in educational science class for clarity of items. Items were revised based on experts and students' comments. In addition, internal consistency reliability tests of the instruments were assessed using data of the 30 students from the educational science class. Acceptable values of Cronbach's alpha were obtained (0.75 and 0.82, respectively for the two scales). Cronbach's alpha also revealed high internal consistency reliability for the 5 subscales (discussed in the following sections) of the *Reasons for Help Seeking Avoidance* scale (ranged from 0.75-0.88).

### *Frequency of help seeking*

Frequency of academic help seeking was measured by the total number of content-related questions asked by students during the entire course. All other questions regarding details of course assignments, dates of exams or general issues about course enrollment were not counted.

In the online section, participation events of help seeking were collected by: 1) analyzing log data recorded via Blackboard about the number of questions posted by each student under “Ask Questions” area within the discussion board forums; 2) content analysis of students' posts when responded to questions or when commenting on other students' answers under each discussion board question; 3) counting questions posted during live-chats; 4) number of students' questions to each others in the group pages (if related to course contents); and 5) content-related questions sent to the instructor via e-mails. The number of help seeking events using the first four methods that reflects student-student and student-instructor interaction via Blackboard were counted by the course instructor and verified by another instructor who taught the course in previous semesters. Questions asked via direct e-mails to the instructor were counted by the course instructor.

In the traditional section, in-class questions were counted using an observation technique; while questions asked during the office hours or e-mails were counted by the course instructor. A fourth year nursing student and an instructor who taught the course in previous semesters attended all lectures and were trained to record students' questions. The agreement between the two data collectors about the number of questions recorded per each lecture was measured. Students in the classroom were not informed about the real reason of the observers' attendance.

### *Student Help Seeking Strategies towards Academic Difficulties*

A 5-point Likert scale of six items was developed to measure strategies used by students when facing academic difficulties or lack of understanding of the contents. The scale ranges from 1= never, 3= sometimes, to 5= always. The items represent six different strategies including: 1) seeking help from a formal resource (i.e., instructor) covertly (in privacy, such as via using e-mails); 2) seeking help from a formal resource overtly (in front of class); 3) seeking help from informal resources (i.e., peers); 4) performing instrumental activities (e.g., improve performance through extracting more effort); 5) lowering their performance aspiration (e.g., accept missing some information); and 6) avoiding help seeking.

### *Reasons for Help Seeking Avoidance*

A 5-point Likert scale of agreement where 1= strongly disagree, 3= neutral, and 5= strongly agree was created to measure reasons for help seeking avoidance. The scale consisted of 22 items that represent 5 subscales as follows: 1) attitude towards asking questions (4 items, sample item, “I consider the essence of participation as answering the instructor questions rather than asking questions”); 2) desire for autonomy and self-reliance (4 items, sample item, “I try to understand the contents myself without asking questions”); 3) the structure and presentation of the learning material (3 items, sample item, “Explanation of materials was very clear in Blackboard video/class so there was no need to ask questions”); 4) social climate of the learning environment (6 items, sample item, “I think the instructor does not prefer to be asked questions”); and 5) perceived threat and lack of ability (5 items, sample item, “I do not want anyone to know that I am having difficulty understanding the contents”).

## **Data Analysis**

Data were analyzed using SPSS<sup>TM</sup> version 16 (SPSS Inc., Chicago, IL). Descriptive statistics of means and standard deviations were presented for each item and scale used in the study. Independent samples t-test was used to answer a) the first research question (the difference between the means of number of questions asked by students in the two sections) and b) the third

question which concerns difference in reasons for help seeking avoidance between the two sections. For the second research question, chi-square was used to examine the relationship between the variable student section (online and face-to-face) and the variable strategies used by students when they encounter academic difficulties. To answer the fourth question, stepwise regression was used to identify significant predictors for the number of questions asked by students, where the 5 subscales of reasons for help seeking avoidance were used as predictors. Pearson's  $r$  was used to answer the fifth research question which concerns the relationship between help seeking events and student achievement.

Since students in the two sections had different sample sizes, the equivalence of variance assumption was tested every time t-test was applied using Levene's test. If results of Levene's test were significant, the result of t-test when "equal variances not assumed" was used. In addition, since t-test was used more than once to test different research questions in this study, the alpha level was adjusted using Bonferroni correction procedure using the standard formula;  $\alpha_{\text{adjusted}} = \alpha/k$  ( $k$  = number of tests) (Tabachnick & Fidell, 2001). This adjustment was necessary to ensure that the risk for each given test remains at 0.05. Since t-test was used 6 times in this study, the adjusted alpha was 0.008.

## Results

### *Student Characteristics*

Student characteristics in the two classes are shown in Table 1. Majority of students in the two classes were males and all were in their second and third year of the program. No differences in mean age and accumulative grade point average (GPA) or proportions of gender and academic year were found between students in the two classes ( $p > .05$ ). Out of a 5-point Likert-type scale, the mean score of computer skills reported by students in the online section was 2.5(0.9). Out of a 4-point Likert-type scale, self-reported "use of e-mail for educational purposes before this course" in the two classes was below average, and increased from 1.1 (0.3) to 2.3(0.7) after this course for the online class. The majority of students in the online class have no previous experience in using Blackboard.

### *Differences in Help Seeking Frequencies*

During the entire semester, students in both classes attended 13 lectures. The agreement between the two observers who recorded help seeking frequencies in the traditional face-to-face class ranged from 95%-100% for all lectures. There was a total of 60 content-related questions asked in the online class (mean = 2.4, SD = 2.5) and 220 in the traditional class (mean = 7.1, SD = 6.9). The difference in mean number of questions asked between the two classes was statistically significant ( $t = 3.06$ ,  $p = .001$ ). Out of the 25 online students, 10 (40%) had never asked any questions during the entire course and the other 15 (60%) students asked between 1- 7 questions each. Out of the 31 face-to-face students, 8 (26%) had never asked any questions during the entire course while the other 23 (74%) students asked between 1- 23 questions each.

In the traditional class, the majority of questions (211) were asked in class while there were only 3 questions asked by the e-mail and 6 during the office hours. In the online class, e-mail to instructor was the most commonly method used for help seeking (total of 20 questions), followed by questions about other students' posts under discussion board forums (15 questions), and questions asked under "Ask Question" area within Blackboard (14 questions). The number of questions asked via other methods was trivial (7 questions during the live chats and 4 using group pages).

**Table 1**  
**Student characteristics**

Variables	Online (N= 25)	Face-to-face (N=31)
	Mean (SD)	Mean (SD)
Age (Years)	20.9 (1.7)	21.2 (2.1)
GPA (out of 4)	2.7 (0.4)	2.8 (0.5)
Computer skills (5-point scale)	2.5 (0.9)	2.3 (0.7)
Email use for educational purposes in previous courses (4-point scale)	1.1 (0.3)	1.0 (0.2)
Email use for educational purposes after this course (4-point scale)	2.3 (0.7)	1.2 (0.2)
Variables	Frequencies	
Gender		
Male	18 (72%)	22 (71%)
Female	7 (28%)	9 (29%)
Academic Year		
Second	12 (48%)	14 (45%)
Third	13 (52%)	17 (55%)
Previous Use of Blackboard		
Yes	7 (28%)	9 (29%)
No	18 (72%)	22 (71%)

### ***Student Strategies towards Academic Difficulties***

Table 2 shows percentages of students in both classes who answered “always” and “most of the time” to items that measured how students act when they confront academic difficulties. As shown on the table, the most common strategies used by students in the online class were “avoid help seek”, and “seek help from informal resources”, while “seek help from a formal resource overtly”, and “seek help from informal resources” were the most common strategies used by students in the traditional class.

The proportion of online students who reported using overtly seeking help from the instructor (32%) was significantly ( $p<.05$ ) lower than the proportion of students in the traditional class who reported using the same strategy (61%). However, the proportion of online students who used “seek help from a formal resource covertly” strategy (48%) was significantly ( $p<.05$ ) higher than the proportion of students in the traditional section who used the same strategy (9%).

Furthermore, there were no significant differences ( $p>.05$ ) in the proportions of students in the two classes who used “avoid help seeking”, “seek help from informal resources”, and “perform instrumental activities” strategies. Finally, the difference between the proportions of students in the two groups who used “lower performance aspiration” strategy (24% in the online group vs.

6% in the traditional group) was significant ( $p < .05$ ), and in the favour of the online students, although very small number of students reported the use of this strategy in the two classes.

Interestingly, almost half of the face-to-face students and 64% of the online students reported that they will avoid help seeking and will not ask questions even though they feel a need to understand the material. “Peers” was a major source for help seeking as reported by more than half of students in the two groups, and also almost 40% in each class reported that they would try finding the answer to their questions by themselves.

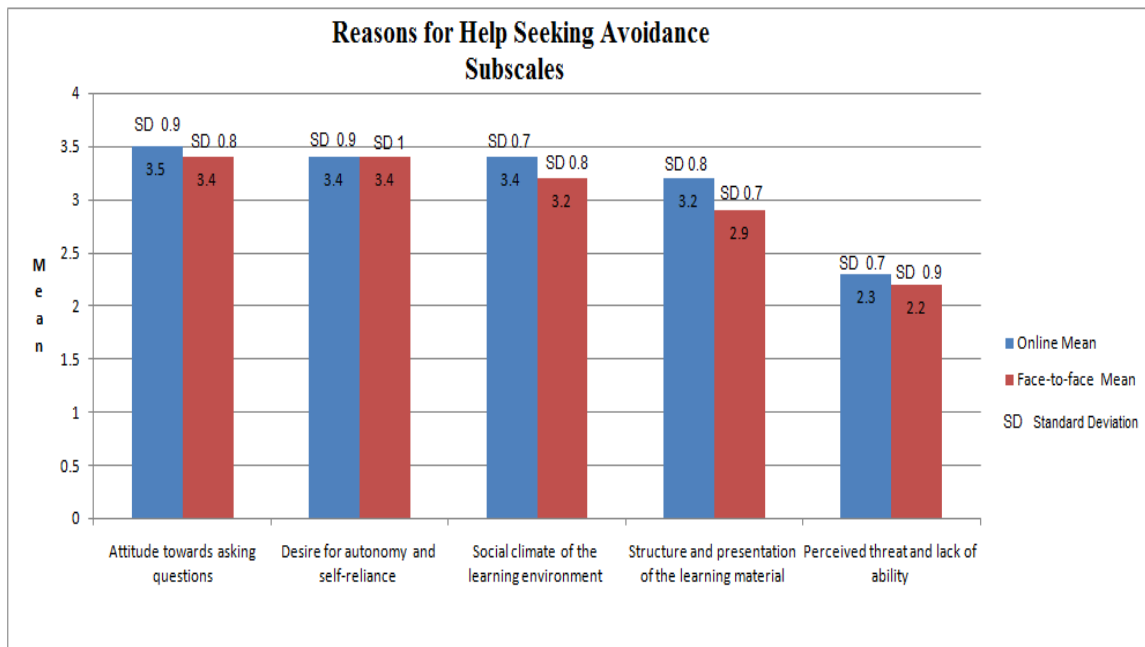
**Table 2**  
**Strategies used by online and face-to-face students**  
**when they encounter academic difficulties**

Strategy	Item	Online (N=25)	Face-to-face (N=31)	Sig.
Seek help from a formal resource overtly	Ask the question to the instructor in front of class (using “Ask Questions” area in Blackboard for online students or in the lecture for face-to-face students)	8 (32%)	19 (61%)	$p = .03^*$
Seek help from a formal resource covertly	Ask the question to the instructor in privacy not in front of the peers (via e-mail or office hours)	12 (48%)	3 (9%)	$p = .001^*$
Avoid help seeking	Decide not to ask even though I feel a need to understand the material	16 (64%)	14 (45%)	$p = .13$
Seek help from informal resources	Ask one of my peers in class	16 (64%)	18 (58%)	$p = .39$
Lower performance aspiration	I do not think it is important to know everything in the material	6 (24%)	2 (6%)	$p = .04^*$
Perform instrumental activities	Try to study the contents in order to know the answer to all my questions	10 (40%)	13 (42%)	$p = .51$

\*: significant at  $\alpha < 0.05$

### **Reasons for Help Seeking Avoidance**

Figure 1 shows the differences between the online and traditional groups on the subscales of reasons for help seeking avoidance. The results of the subscales were ranked from highest to lowest importance as rated by students. Items related to student attitude toward asking questions were the most important reasons deter students from seeking help in the two classes, followed by desire for autonomy and self-reliance, social climate of the learning environment, structure and presentation of the learning material, and lastly the perceived threat and lack of ability. Students in the two sections have similar reasons for avoiding help seeking with no significant differences found on these subscales (t-test values = 0.15, 0.11, 1.5, 1.00, 0.60 respectively,  $p > .008$ ).



**Figure 1: difference in means of online and face-to-face classes on help seeking avoidance subscales**

### ***Help Seeking Avoidance Subscales as Predictors of the Number of Questions Asked by Students in the Online and Traditional Classes***

In order to understand the importance of the five help seeking avoidance subscales in predicting the number of questions asked by students, a stepwise regression test was used for the two classes (Tables 3 and 4). For students in the online class, step one of the analysis showed that “structure and presentation of learning material subscale” is a significant predictor of number of questions asked, accounted for 24% of the variance of number of questions,  $R^2=0.24$ ,  $F=7.11$ ,  $p<.05$ . Step 2 of the model indicated that “attitude towards questioning” added significantly to the prediction of number of questions,  $R^2$  change=0.32,  $F=13.71$ ,  $p<.001$ . The same step showed also that the linear combination of the two variables accounted for 56% ( $R^2=0.56$ ) of the variance of the number of questions asked by students. According to the results shown in Table 3, the prediction equation of number of questions asked by online students as a dependent variable and student degrees on the variables (subscales) “structure and presentation of learning material” and “attitude towards questioning” as predictor variables can be presented as the following:

*Number of questions for students of the online class =  $2.59 - 1.81 * (\text{Structure and presentation of learning material degree}) + 1.89 * (\text{Attitude towards asking questions degree})$ .*

Table 4 shows stepwise regression results for prediction of number of questions asked by students in the traditional class using the 5 help seeking avoidance subscales as predictors. As shown in the table, the only significant predictor of the number of questions was “Attitude towards asking questions” accounted for 18% of the variance of the number of questions asked, ( $R^2=0.18$ ,  $F=7.07$ ,  $p=.01$ ). According to these results the prediction equation of number of asking question for students in the traditional class as a predicted variable and student degree in the variable (subscale) “Attitude towards asking questions” as a predictor variable can be presented as the following:

*Number of questions for students of the traditional class =  $18.34 - 3.53 * (\text{Attitude towards asking questions degree})$*

**Table 3**  
**Stepwise regression for prediction of number of questions in the online class**  
**using 5 help seeking avoidance subscales as predictors (N= 60 questions)**

Step	Variable	R	R Square	Adjusted R Square	F	Sig. F Change	Overall model sig.
1	Structure and presentation of learning material subscale	0.49	0.24	0.20	7.11	.01	.014
2	Structure and presentation of learning material subscale <b>AND</b> Attitude towards asking questions subscale	0.75	0.56	0.51	13.71	.001	.0001

Variable	Weight (B)	T	P-value
(Constant)	2.59	1.58	.14
Structure and presentation of learning material subscale	-1.81	-4.58	.000
Attitude towards asking questions subscale	1.89	3.97	.001

### ***The Relationship between Frequency of Help seeking and Achievement***

In the two classes, Pearson's correlation coefficients indicated positive significant relationships between the frequency of help seeking events and student achievement ( $r = 0.41$ ,  $p = .02$  in the online,  $r = 0.42$ ,  $p = .01$  in the traditional class). That is the higher the number of content-related questions asked by students the higher the student achievement.

In addition to these results, we examined the difference in achievement between the online and traditional sections. Although this was not part of the research questions in this study, we thought that this extra analysis would help explain the unexpected results of the lower number of help seeking events in the online group compared to the traditional group. Interestingly, student achievement in the online class was significantly higher ( $80 \pm 8.2$ ) than achievement of the traditional class ( $72 \pm 10.5$ ), ( $p = .01$ ).

**Table 4**  
**Stepwise regression for prediction of number of questions in the traditional class**  
**using 5 help seeking avoidance subscales as predictors (N= 220 questions)**

Step	Variable	R	R Square	Adjusted R Square	F	Sig. F Change	Overall Model significance
1	Attitude towards asking questions subscale	.42	0.18	0.15	7.07	.01	.01

	Variable	Weight (B)	T	P-value
	(Constant)	18.34	3.94	.0001
	Attitude towards asking questions subscale	-3.53	-2.66	.01

## Discussion

The increase use of online learning has led to a growing interest in providing a comparative evaluation of online and other learning environment where face to face is dominant. The present study sought to compare between students' academic help seeking strategy in face-to-face and online learning environments. Specifically, it explored and compared: a) the actual number of content-related questions students asked; b) strategies they enacted when faced by academic difficulties; c) reasons that deter them from seeking help; and d) the relationship between help seeking and students' achievement.

The following section discusses results of the current study in light of the theoretical accounts and relevant empirical research in the field of online education and academic help seeking as well as highlights the major contributions of this study to the body of knowledge.

### ***Number of Questions Asked in the Online versus Face-to-face Sections of Course.***

Research on traditional learning environments reported that university students avoid seeking help in class because of the feeling of embarrassment and threat (Ryan & Pintrich, 1997; Karabenick, 1998). However, it was hypothesized that students in the online section would be more willing to ask for help than students in the face-to-face section, because they engage in a dialog in the absence of social cues, and are allowed to contact their instructor at any time, and have plenty of time to construct and revise their questions. Surprisingly, the actual number of questions asked in the online section is significantly fewer than that in the face-to-face section. Although the current result is inconsistent with some research findings (Anderson & Lee, 1995; Kitsantas & Chow, 2007) that support the above theoretical account, it is consistent with other studies (Caspi, Chajut, & Saporta, 2006; Crombie, Pyke, Silverthorn, Jones, & Piccinin, 2003) which showed that students' participation in an online environment is lower than that in a face-to-face one. To clarify this result other factors such as the lack of sufficient skills required to work in online learning environments (e.g., computer, use of Blackboard, and writing skills) should be considered. In the current study, for example, the majority of students have no previous experience in using Blackboard, and reported having average computer skills and low use of e-mail for educational purposes. The lack of the above skills might explain the low number of questions asked by students in the online section.

### ***Strategies Used by Students when they need Academic Help and their Relationship with Students' Section.***

In the current study, students were presented by six strategies that they may use when facing academic difficulties or lack of understanding of the course contents, including help seeking from formal resource covertly or overtly, help seeking from informal resources, performing instrumental activities, lowering performance aspiration or avoiding help seeking. It was hypothesized that students in the online section would not report help seeking avoidance, because of availability of synchronous and asynchronous communication tools, and because they will be less concerned about social embarrassment in comparison with students in the face-to-face section (Dede, 1996). The results revealed that the majority of students in the online section avoid asking for help, and if help is necessary for them, they would approach their peers. In the face-to-face section, majority of students reported they would seek help from their instructor overtly, or approach their peers when they need help. Specifically, almost half of the students in the face-to-face section and 64% of the students in the online section reported that they will avoid help seeking; these results were verified by the actual number of questions asked by students in both sections. It is worth noticing that although 40% of students in the online section, and 26% of the students in the face-to-face section had never asked any questions during the entire course, among those who asked questions there were some who only participated in few questions (1-3 questions) during the entire semester. Therefore, it seems that a larger majority of students in both sections would most of the time avoid help seeking. This can be explained as despite the absence of visual and the non-verbal communication in the online learning environment, the fact that this environment keeps permanent records of all students' interactions may affect the amount of covert help seeking; however, students may feel more privacy and security in their direct e-mails or contacts to other peers. It is also worth noticing that more than half of the students in both sections reported that they would approach their peers for help when needed. This result is consistent with Melrose (2006) findings where "peers" was the primary source of help used by health-care practitioners in an online graduate program.

On the other hand, in the face-to-face section, where face-to-face interaction is available, students may easily express their questions with the help of instructor or peers. Whereas writing a question in the online environment may require a deeper thinking of the question, writing it up and confirming the question again before sending it. In addition to the need of accessible and fast technology which might not be always available for participants of the current study.

Results from analyzing students actual help seeking events in both learning environments revealed that the most commonly used method of help seeking in the face-to-face section was asking the instructor overtly in class, whereas, online students prefer seeking help using the e-mails (covertly) rather than in front of class and mostly use peers for help. These results provide further verification of students' self-report strategies for dealing with academic difficulties. This result is also consistent with previous research findings that students in online learning environments prefer to ask for help using e-mail and don't prefer to use synchronous communication tools to seek help from their instructor (Keefer & Karabeniek, 1998; Kitsantas, & Chow, 2007). Seeking help from instructor covertly and not using synchronous communication techniques reflects students' intention to obtain the necessary help from trustable source (the instructor) without threat concern (i.e., the fact that their questions will be open to all students).

It is imperative to declare that in the current study information about actual help seeking events from peers was not available, in the absence of such information students' self-reported data about seeking help from peers as one of the most commonly used strategy could not be verified by actual help seeking events.

### ***Reasons for Help Seeking Avoidance in both Learning Environments.***

Findings of the current study supports that students were avoiding help seeking, therefore, it was imperative to explore the reasons for this avoidance. It was hypothesized that students in the online section would report the desire for autonomy as one of the main reasons for help seeking avoidance. On the other hand, they would be less concerned about social embarrassment in comparison with students in the face-to-face section. Interestingly, students in the two sections reported having similar reasons for avoiding help seeking. *“Students’ attitudes toward asking questions”* was the most important reason behind help seeking avoidance in both sections, followed by, *“desire for autonomy and self-reliance”*, *“structure and presentation of the learning material”*, *“social climate of the learning environment”*, and finally *“the perceived threat and lack of ability”*. Students’ attitudes towards help seeking and their desire for autonomy and self-reliance can be explained in terms of cultural norms. That is, different cultures may have different views about the role of help seeking in the learning process. The Jordanian culture for example, tends to emphasize self-reliance and individual competitiveness; consequently, help seeking might be viewed as a sign of incompetence, immaturity, and over-dependency on others. Therefore, students perceive participation in class as answering questions and not asking for help. Moreover, students prefer to understand the material on their own, and reported that they will enjoy and learn more when they answer the question by themselves. It is worth noticing that this argument is consistent with the current study result that almost 40% of students in both sections reported using the strategy of “performing instrumental activities”, as they encounter academic difficulty. This strategy includes activities such as, “try to study the content in order to know the answer to my question”, which reflects students’ desire for autonomy and self-reliance.

### ***Reasons for Help Seeking Avoidance as Predictors of the Number of Questions Asked by Students.***

The relationship between the above five reasons for help seeking avoidance and the number of questions asked by students in both sections were tested. The number of questions asked by students in the online section was predicted by “the structure and presentation of learning material” and “attitude towards questioning”. On the other hand, “attitude towards questioning”, was the only significant predictor of the number of questions students asked in the face-to-face section. These results is consistent with our hypothesis that because students in the online section were required to learn the material on their own, the structure of the learning material and the way it was presented would affect students’ decision to seek help in the online section more than students in the face-to-face section who can receive further explanations and clarifications about the contents during class time.

### ***The Relationship between the Number of Questions Asked by Students in both Learning Environments and their Academic Achievement.***

Academic help seeking is viewed as an important self-regulatory strategy that contribute to students’ learning (Karabenick, 2003; Kitsantas & Dabbagh, 2004). Seeking help in a form of asking questions is integral to a meaningful learning process that enhances knowledge construction and reflects active role in learning. Therefore, it is expected that the number of questions asked by students would be positively correlated with students’ academic achievement. Results from both sections revealed that students’ high grade in the course is related to the actual number of help seeking events from the instructor. These findings are consistent with other research findings (Karabenick, 1998; Kitsantas, & Chow, 2007; Wood & Wood, 1999; Renkl, 2002) where help seeking is positively related to student academic achievement.

## Conclusion

In this study, unexpectedly, students in the online section significantly asked fewer questions than students in the face-to-face section. This finding was explained with reference to the lack of computer skills required to interact in the online learning environment. This finding provides implications for universities and instructors to support further training on computer skills for their students, especially for those who register in online courses.

Self-report measures were the most common methods of collecting data in previous research in the field. Self-reported measures have been criticized for a number of technical and methodological issues, including that students are required to think about actions in retrospect and are subject to memory decay and distortion. In the current study, an observation method for counting the number of questions students asked was utilized in addition to automatically recorded log files. Our results showed some discrepancy between students' self-reported strategies (i.e., strategies they used when they encountered academic difficulty), and their actual help seeking events. For example, students in the online section reported avoiding help seeking, and approaching peers for help as the most commonly used strategy towards academic difficulty, however, the actual help seeking events revealed that asking questions to the instructor was the most commonly used by students. These findings support the above criticism of self-report measures, and suggest that conflicting findings from previous research about the use of help seeking strategies and its' effect on students' learning may have been due to differences in measuring help seeking. Our results provide vital implications for researchers to have other methods of collecting data in order to verify their results and to capture the complexity of students' learning activities.

Academic help seeking differs from most other learning strategies in that it is a social transaction between a learner and another person (instructor or peer) within a particular sociocultural context of learning. Previous research has accumulated significant information about reasons for help seeking avoidance, including several personal factors, as well as, classroom structure and social climate. The current study showed that students in both sections avoid help seeking for similar reasons. Specifically, the most important reasons were students' attitudes towards asking questions (e.g., they consider the essence of participation as answering questions rather than asking questions), followed by students' desire for autonomy and self-reliance (e.g., they wanted to know the answer by themselves), the way the content materials were presented (e.g., clear, stimulates asking questions), social climate of the learning environment (e.g., instructor/peers would make fun of them), and finally, perceived threat and lack of ability (e.g., fear of looking stupid). Attitude towards asking questions and presentation of the material were the only significant reasons related to the number of questions in the online section, whereas only students' attitude was found to be related to the number of questions asked by students in the face-to-face section. These findings provide a significant implication for the instructor and the designer of the online courses. That is, 1) course materials should be designed in a way to challenge students' thinking and stimulate questioning, and 2) students should be informed about the importance of help seeking strategy in fostering a deeper learning in order to change their negative attitudes about this strategy.

Furthermore, our research compiled evidence about the significance of asking questions towards students' learning. The current findings showed that higher achievement was associated with the higher number of questions asked by students. Therefore, when students do not ask for help when they need it, they run the risk of undermining their learning and achievement. Thus, one way to excel students' learning is by encouraging them to seek help when they need it. Altogether, the current study contributes to our understanding of learning that occurs in technology-mediated environments.

Finally, it is important to highlight some issues that might affect the interpretation and generalization of this study. First, one of the researchers taught both sections, which might introduce some bias. However another faculty blindly graded students' work, administered the study instruments, and verified the content analysis of students' posts to count help seeking events. Second, sometimes during the semester there were some technological difficulties accessing the course which may affect students' performance in the online section and frequency of posting questions. Third, the majority of students lack previous experience with Blackboard. Although research showed that previous experience with internet tools did not affect the amount of activities carried out by students, it affected the way students organized their online activities (Shih, Mun˜oz, & Sa´nchez, 2006). Fourth, although a convenience sampling approach was used to recruit study participants, the sample size in both sections was relatively small.

Replication of the current study in other fields of study, with larger sample sizes, and considering other factors contribute to most models of help seeking would be important contribution to the field of online education, nursing education and educational psychology.

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### About the Authors:

**Randa A. Mahasneh, PhD**, Assistant Professor of Educational Psychology, Faculty of Educational Sciences, Hashemite University, Zarqa, Jordan.

E-mail address: [r\\_mahasneh@hotmail.com](mailto:r_mahasneh@hotmail.com)

**Azizeh K. Sowan, PhD, RN**; Assistant Professor; School of Nursing, Hashemite University, Zarqa, Jordan.

**Yahya H. Nassar, PhD**, Associate Professor; Research and Evaluation, Faculty of Educational Sciences, Hashemite University, Zarqa, Jordan.

### FUNDING SOURCES:

**This study was funded by the Hashemite University/Research Deanship of Scientific Research.**

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**Editor's Note:** In 1960's research, "immediate knowledge of results" was found to be a powerful reinforcement; extended response times were found to be less effective. In face-to-face learning, there is limited time for interactive learning so that many questions remain unasked. Online learning provides opportunity for extended dialog and some students report their online experiences are more interactive than in the classroom. This study determines effectiveness of online learning for one aspect of English grammar.

## **Asynchronous Computer-Mediated Corrective Feedback and the Correct Use of Definite/Indefinite Articles**

**Esmail Faghih, Seyyed Behrooz Hosseini**  
USA and Iran

### **Abstract**

This study investigates the probable effectiveness of asynchronous computer-mediated corrective feedback—explicit/implicit, on increasing the correct use of definite and indefinite articles. Forty-five Iranian elementary EFL learners at the ILI in Tehran were randomly assigned to two experimental groups, receiving explicit and implicit corrective feedback respectively, and one control group receiving no corrective feedback. Each group included fifteen participants. After the treatment, a posttest was administered to assess the probable increase in the correct use of definite/indefinite articles for the experimental groups in comparison with the control group. Analysis of the results through two separate ANOVAs revealed that the experimental group 1 who received explicit corrective feedback significantly outperformed the experimental group 2 and the control group in terms of the correct use of indefinite articles. Contrary to previous research, controversial results were found because neither of the experimental groups significantly outperformed the control group regarding the correct use of definite article.

**Keywords:** computer-mediated communication, asynchronous CMC, synchronous CMC, the Internet, corrective feedback, e-mail, chat, interlanguage, critical thinking, problem solving, Noticing Hypothesis.

### **Introduction**

Since the introduction of the Internet as a means of communication and prevalence of computers, more and more people have been using electronic media, to cover hosts of purposes such as interpersonal communications, sending/ receiving information, educational and language learning/teaching perspectives, etc. The application of computers and the Internet as a medium for communication can be expected to have a myriad of positive effects on language learning and teaching. It has been proved that communication through the Internet will have a significant motivational effect on the students (e.g., Meunier, 1996; Warschauer, 1996) which further helps them to improve their communicative skills both orally and in the written form. The introduction of computer technologies such as the Internet, e-mail, chat, etc into educational environments has made it possible for learners to communicate ideas, information, and their feelings without any limit on time and space (Quan-Hasse et al., 2005). Similarly, Zhao (2006, p14) refers to the application of the Internet and says that "The Internet is the first major medium of communication that allows people to establish new social contacts outside the face-to-face context as well as to maintain existing ties formed in corporeal copresence". Carter (1997) also states that the emergence of faxes, e-mail communications, and word-processed texts has changed the ways in which written language can be utilized to maintain interpersonal interaction among different interlocutors within their social, cultural, and learning context.

### **Computer-Mediated Communication**

Language educators and specialists have recently begun to discover the potentiality of computer technologies and in particular computer-mediated communication (CMC) for language teaching

and learning. The term CMC was first coined and introduced by Hiltz and Turoff (1978) while experimenting on computer conferencing as a means of communication on the Internet. Barnes (2002) defines CMC as a wide range of technologies that paves the way for human interaction and communication and sharing of information through interconnected networks of computers including e-mail, discussion groups, newsgroups, and real-time chat. December (1997, p 3) also states that “Computer-Mediated Communication is a process of human communication via computers, involving people, situated in particular contexts, engaging in processes to shape media for a variety of purposes”. Having been adopted in language learning and teaching, CMC has been proved to be more effective than class-restricted environment in that students no longer feel bored and frustrated with monotonous materials, methods of teaching, and course presentation and can learn new things in much more interesting and effective ways.

Fey (1998) maintains that, “computer networks are allowing students to transcend boundaries of classroom walls and to learn in new ways” (p. 86). According to Warschauer (2001), CMC or “on-line communication refers to reading, writing and communication via networked computers” and comprises of: (a) Synchronous computer-mediated communication, whereby people communicate in real time via chat or discussion software, with all participants at their computers at the same time; (b) Asynchronous computer-mediated communication, whereby people communicate in a delayed fashion by computer, e.g. by email; and (c) The reading and writing of on-line documents via the internet. (p. 207) Recently, pedagogical contributions of computer technologies have been extensively researched and beneficial outcomes have been reported. CMC can be greatly utilized in order to work on the writing improvement of English learners because according to Goodman and Graddol (1996), computer-mediated technologies are mostly concerned with written texts through English language resulting in direct teacher-student interaction focusing on linguistic accuracy of the learners.

By making a comparison between CMC and face-to-face communication, Bordia (1996) aptly concludes that CMC is “a combination of written and oral styles of communication” (p. 150). Maynor (1994) also maintains that e-mailing as one of the primary means of communication regarding asynchronous CMC (ACMC), represents itself as a converging point for both oral and written modalities in a two-way communication. This means that, computer-mediated writing, also exhibits characteristics of face-to-face communication. ACMC, as the name speaks for itself, provides mediated media of communication which provides interlocutors with an opportunity to deliberate, review, revise or even cancel the flow of communication before sending the information to the recipient (Heisler & Crabill, 2006). This valuable property of ACMC helps learners learn how to reflect on the content of what they are going to convey and be critical of what they have in mind before communicating it to others. Therefore, asynchronous communication through computer can deeply involve learners in the processes of critical thinking (Lee, 2004) and, according to Jonanssen and Kwon (2001), problem solving by demanding more focused and purposeful communication. Warschauer (1995) also emphasizes the role of e-mail in CMC and says that e-mail is the most important application regarding the Internet. It has also been suggested that using computer technologies such as e-mail and chat help learners increase their opportunities to use target language (Barson, Frommer, & Schwartz, 1993).

Thus, these opportunities result in the improvement of the quality of written and spoken language (Sotillo, 2000) and negotiation of meaning (Blake, 2000). Sotillo (2000) also maintains that because of delayed nature of e-mail, learners have more opportunities to produce syntactically complex language resulting in a significant change of attitude toward increasing accuracy-awareness of learners while writing in the target language.

### ***Corrective Feedback and Learning***

In the course of learning target languages, it is quite possible that learners deviate from the target-like form of the language by making syntactic errors and mistakes which, according to Schmidt's

(1990) Noticing Hypothesis, are indicative of differences between the target form and learners' interlanguage. In cases like this, usually teachers resort to giving students appropriate feedback as to guide them towards the target language. The mismatch between what the learners receive as input and what they produce as output can be effectively dealt with by means of appropriate corrective feedback provided by the teacher (Compillo, 2003) which helps learners integrate correct language. According to Lightbown and Spada (1990), corrective feedback is any indication to learners by teachers that their use of the target language is erroneous and needs to be modified. As stated by Long and Robinson (1998), when learners interact with one another, they receive feedback based on which, modified output is provided resulting in the development of learners' interlanguage. Brown (1988) also states that feedback should be provided for learners as it helps them experience the effect of what they have produced as a guide to their future output. Having identified an error in the process of interaction, teachers can resort to two types of negative corrective feedback as a response to the mismatch: *explicit* and *implicit* corrective feedback.

According to Compillo (2003), "explicit corrective feedback involves the explanation of a formal aspect after an error has been made. In turn, implicit corrective feedback refers to ways which indicate that the learner's output is somehow erroneous, and needs to be reformulated" (p. 210). Appendix A summarizes definitions and examples of corrective feedback strategies proposed by Lyster and Ranta (1997) as cited in Sauro (2009, p. 99), regarding teacher-student interaction. Compillo (2003) also states that corrective feedback is crucial to the development of second language as it provides the learners with opportunities to contemplate on and take into account other possibilities.

Compillo (2003) cites Carroll and Swain (1993) and states that corrective feedback is "also applicable to the foreign language (FL) context, in the sense that it may trigger the cognitive processes required for acquisition" (p. 212). In conclusion, it can be argued that, research on learning outcomes following computer-mediated corrective feedback is still limited (e.g., Loewen & Erlam, 2006; Sachs & Suh, 2007) and to the best of our knowledge, no attempt has ever been made, especially in Iran, to assess the effectiveness of asynchronous computer-mediated corrective feedback—explicit/implicit, via e-mail on the correct use of English articles. Therefore, the present research was undertaken with the hope that its findings might help to enhance the practices of TEFL.

## Theoretical Background

### ***Corrective Feedback***

Different studies have been carried out which have investigated the effectiveness of both explicit and implicit corrective feedback on the grammatical and linguistic accuracy of learners' production. Campillo (2003) refers to some previous research on explicit/implicit feedback and mentions that Lightbown and Spada (1990) analyzed the effect of explicit corrective feedback in an intensive communication classroom having English as the second language and found out that teaching of formal aspects of language contributed positively to the learners' linguistic and grammatical accuracy. Campillo (2003) also states that implicit corrective feedback has been thoroughly investigated and integrated into teaching environments in several ways and positive results have been reported. Campillo (2003) refers to Lyster and Ranta (1997) and says that they carried out their study through different types of corrective feedback ranging from explicit to implicit at primary levels. Accordingly, as stated by Campillo (2003), "The findings of the study revealed that recasts were the most used technique by the teachers (55% of the cases), followed by elicitation (14%), clarification requests (11%), metalinguistic feedback (8%), explicit correction (7%), and repetition (5%)" (p. 212). In the same way, Zhuo (2010) conducted a study regarding corrective feedback examining "the relative effects of explicit and implicit recasts on the acquisition of English noun plural by Chinese EFL learners" (p. 55). In this study, students

were randomly assigned to three groups: the first group received corrective feedback through explicit recast; the second group received implicit recast; and the last group acted as the control group receiving no feedback. In line with Compillo's findings, the results of Zhuo's study showed that recasts were more effective than other types of corrective feedback in bringing students' attention to their erroneous language structures. Sheen (2004) also examined the role of corrective feedback in increasing learners' uptake in communication classes in four contexts: "French Immersion, Canada ESL, New Zealand ESL and Korean EFL" (p. 263). Findings of this study indicated "that recasts were the most frequent feedback type in all four contexts but were much more frequent in the Korean EFL and New Zealand ESL classrooms (83% and 68%, respectively) than in the Canadian Immersion and ESL classrooms (55% for both)" (p. 263). Brief review of corrective feedback literature revealed that most studies have so far been done with respect to recasts and a little, if any, investigation has been conducted regarding other types of corrective feedback such as explicit, repetition implicit, etc.

### ***Synchronous and Asynchronous CMC and Corrective Feedback***

According to Sauro (2009), as technology is making its way into language teaching and learning environment, regarding interaction and corrective feedback, written CMC holds particular promises for the learning of complex and low salience features and forms. Thus, synchronous and asynchronous CMC environments are ideal contexts for the investigation of corrective feedback during written communication as they provide student-teacher interaction in a way that increases students' awareness towards target-language structures and eliminates time and distance limitations. Corrective feedback in this sense can draw learners' attention to discrepancies between learners' output and target-like norm and facilitate the occurrence of noticing of the gap which according to Schmidt (2001) is the "first step in language building" (p. 31). Sauro (2009) also states that according to Schmidt's (1990) Noticing Hypothesis "for learning to occur, second language learners must attend to and notice details and differences between the target language and their interlanguage and its representation in their production of output" (pp. 96 - 97).

It should be mentioned that some studies have also investigated synchronous and asynchronous computer-mediated corrective feedback in language learning and teaching environments in order to substantiate the efficacy of corrective feedback through CMC on the improvement of learners' linguistic and grammatical abilities. Hanson-Smith (2001) cites Holliday (1999) for his experiment with a large corpus of students' e-mails and mentions that Holliday "has established that electronic communication provides a range and distributive frequency of linguistic features comparable to other genre of writing and speaking. He suggests that the repetitive nature of e-mail ... assists learners in understanding linguistic cues" (p. 109). This study clearly shows that CMC can help learners improve grammatical accuracy of their writing due to the fact that they use linguistic cues more frequently and therefore pay more attention to the accuracy of their writings. Romm and Pliskin (1999) also support that ACMC through e-mailing provides learners with a friendly environment in which they no longer have the feeling of being isolated and excluded. Accordingly, they contribute more willingly to maintain the flow of communication, pay more attention to the teacher-provided instructions with the result of more accurate and grammatically complex production, and participate in interpersonal interactions with others more than before.

Few studies (e.g., Lea, 2001) on ACMC and students' academic writing assignments show that students make use of online collaborative learning context, reflect on their own learning, draw upon their peers' feedback in the construction of their own knowledge, and thus benefit in their own academic writing. In one study on ACMC, St. John and Cash (1995) found out that an adult language learner dramatically improved his German via e-mail exchanges with a native speaker, because the learner systematically studied and reflected on the new vocabulary and grammatical structures in his incoming e-mails and used this information to improve the content of his future

letters with impressive results. This is indicative of the usefulness of learner's interaction with a more capable peer (Vygotsky, 1978) such as teachers, native speakers, etc resulting in receiving appropriate feedback. Therefore, this can be viewed as an undeniable fact that ALCMC via e-mail exchanges can be expected to improve learners' grammar and linguistic awareness through explicit/implicit feedback provided by a more capable peer. Similarly, most studies on the efficacy of corrective feedback through SCMC have so far been concerned with recasts and meta-linguistic types of feedback and promising results have been produced.

As opposed to e-mail which is the most applicable tool regarding asynchronous studies, application of chat, as an appropriate learning/teaching medium regarding SCMC, has been gaining increasing popularity among scholars and researchers likewise, due to the fact that it resembles face-to-face communication in its immediacy of interaction. Finally, in one study, Razagifard and Rahimpour (2010) investigated the effectiveness of corrective feedback through chat on learners' grammar improvement and found out that meta-linguistic corrective feedback is more effective than recasts in getting learners to both notice the gap and enhance their ability to correct ungrammatical structures.

## The Present Study

The present brief survey of related literature reveals that few researchers have so far embarked on investigating the effects of explicit and implicit computer-mediated corrective feedback through e-mail in Iran and even internationally. Moreover, most studies in this field have so far primarily dealt with the impact of recasts and meta-linguistic types of corrective feedback via SCMC and chat. Consequently, the aim of the present study was to investigate the extent to which asynchronous computer-mediated corrective feedback might be effective in promoting learners' correct application of English articles and the following research questions were proposed:

- Q1. Does asynchronous computer-mediated corrective feedback have any significant effect on the correct use of *definite* article? Q2. Does asynchronous computer-mediated corrective feedback have any significant effect on the correct use of *indefinite* articles?

## Method

### Participants

The participants of this study consisted of adult elementary EFL learners from the Iran Language Institute (ILI) in Tehran aged 16 or more whose mean age was 21. The reason for selecting elementary learners was that it was assumed that since they were beginners, they would not know much about the details of EFL syntax. In order to make sure of the learners' proficiency level and homogeneity, Key English Test (KET, 2009) was administered prior to the treatment. The participants were selected voluntarily and according to their access to the Internet out of the class sessions. Out of the subject pool, forty-five participants (N=45) were randomly identified as two experimental groups and one control group, i.e. each group consisted of 15 participants. The experimental group 1 (N=15) received explicit corrective feedback, the experimental group 2 (N=15) received implicit repetition corrective feedback, and the control group (N=15) received placebo feedback. Assignment of the participants to the experimental and control groups were random as well.

### Target Structure

Definite and indefinite articles were chosen in this study as target forms for two reasons. First, because as Faghih (1997) has shown, articles are among the most difficult and troublesome features of EFL for all learners including Iranian learners. Second, syntactically speaking, articles are one of the most salient and frequent features of English language. So in this study, the emphasis was put on increasing the awareness over the correct use of articles rather than on

instructing the learners how to use articles. Therefore, this study attempted to enhance learners' ability to correctly apply definite and indefinite articles through asynchronous computer-mediated corrective feedback.

### **Instruments**

The participants of this study were presented with their regular coursebooks developed by the ILI. Elementary coursebooks at the ILI comprise of ten units and each unit is further divided into two sections, and every section is covered in one session lasting for an hour and forty-five minutes. Session one is devoted to conversation, grammar, and vocabulary. Session two covers reading, grammar, and listening. Classes are held twice a week. The total of twenty-one sessions covers the whole term for each of the three elementary levels at the ILI.

The participants were required to submit an e-mail and the modified version of the same e-mail after receiving corrective feedback from the second session on as home assignment every week after covering every unit, using computer or laptop out of the classroom. At the end of the treatment, learners' grammar improvement on definite/indefinite articles was assessed using following instruments as their posttest:

1. Definite/indefinite articles: 1.1. Twenty-two independent sentences to be filled with appropriate articles including thirty-six gaps for *the*, twenty gaps for *a*, and seven gaps for *an* (Neylor & Murphy, 1996; Vince & Emmerson, 2003; Murphy, Altman, & Rutherford, 1989).

### **Procedure**

Prior to the treatment, participants were told that they are required to write at least one paragraph or maximum two consisting of 100 to 150 words every week. From the second session on, they were required to submit an e-mail on a topic in line with their regular coursebook contents provided by one of the researchers as home assignment. All the participants in three groups received the same topic every week. The total of eight writing topics was provided for the participants during the experiment. The experimental group 1 received explicit corrective feedback, i.e. the instructor indicated that an error had been made, identified the error and provided the correction, to which repetition was required by the participants as modified output.

Example (1), asynchronous corrective feedback–explicit:

**Mehran:** I think both of them are important but the conversation is more difficult than the grammar because you can learn it in class ....

**Instructor's corrective Feedback:** I think both of them are important but conversation (you shouldn't say \*the conversation; you should say conversation) is more difficult than grammar (you shouldn't say \*the grammar; you should say grammar) because you can learn it in the class (you should say in the class not \*in class) ....

Modified output by Mehran: I think both of them are important but conversation is more difficult than grammar because you can learn it in the class ....

The experimental group 2 received implicit repetition corrective feedback, i.e. the instructor repeated the learner's utterance highlighting the error by means of emphatic stress, bolded uppercase words, to which reformulation by the participants was required as modified output. It is worth mentioning that the role of the emphatic stress was thoroughly explained to the participants because it required the participants to grammatically correct the bolded uppercase words' usage by adding, deleting, changing, and modifying surrounding or within words. It was also emphasized that the bolded uppercase words had nothing to do with spelling mistakes.

Example (2), asynchronous corrective feedback–repetition implicit:

**Mohammad Amin:** ... And a subject like math mostly needs teacher and most of the students cannot understand what the teacher of the math class says in the class....

**Instructors' corrective feedback:** ... And a subject like math mostly needs **TEACHER** and most of the students cannot understand what the teacher of the math class says in the class....

**Modified output by Mohammad Amin:** ... And a subject like math mostly needs a teacher and most of the students cannot understand what the teacher of the math class says in the class....

In order to make sure of noticing the teacher-provided corrective feedback, the participants of the experimental groups were obliged to send their modified output as an independent e-mail prior to receiving the next new topic. The control group received placebo feedback, i.e. “topic relevant response that does not contain the target form in the same context”, for example: “student: In Sweden the global warming is a problem. Native speaker: Many people believe it's a problem everywhere” (Sauro, 2009, p. 104) to which no modified output was required. Teacher-provided corrective feedback for the experimental groups mainly focused on the correct use of definite and indefinite articles. Other grammatical deviations were corrected without bringing the participants' attention to them. At the end of the treatment, the participants of the three groups were presented with the posttest assessing the extent to which the treatment was successful in enhancing the experimental groups' ability over the control group's to correctly apply definite and indefinite articles. This study was conducted within the period of 8 weeks in the summer of 1390 at the ILI, Fadak branch in Tehran. During the experiment, one of the current researchers held all of the three classes himself, taught the learners, distributed e-mail writing topics every week, provided appropriate corrective feedback to all the groups, and gave the posttest.

## Results and Discussion

Two separate one-way ANOVAs were calculated regarding the correct use of definite and indefinite articles and their means separately. Differences among the experimental and control groups were considered significant at the .05 level.

### *Analysis of Results on Definite Article*

In order to answer the first research question, descriptive statistics had to be calculated first. The summary is shown in Table 1.

**Table 1**  
**Descriptive Statistics on Definite Article**

	N	Mean	Std. Deviation	Minimum	Maximum
Experimental Group 1 (Explicit)	15	32.87	1.457	29	35
Experimental Group 2 (Implicit)	15	31.13	3.441	24	36
Control Group	15	30.80	2.833	25	34

The minimum and maximum scores were 24 and 36 respectively and belonged to the experimental group 2. As Table 1 shows, the experimental groups who received explicit and implicit computer-mediated corrective feedback with the mean scores of 32.87 and 31.13 respectively slightly outperformed the control group with the mean score of 30.80. Experimental

group 1 also performed slightly better than experimental group 2. The differences between the groups' mean scores are represented in the following figure.

In order to investigate the effect of asynchronous computer-mediated corrective feedback on increasing the correct use of definite article, a one-way ANOVA was calculated. The results of the one-way ANOVA showed no statistically significant difference at the  $p=.05$  level of significance for the three groups in this study:  $F(2, 42) = 2.5, p = .09$ .

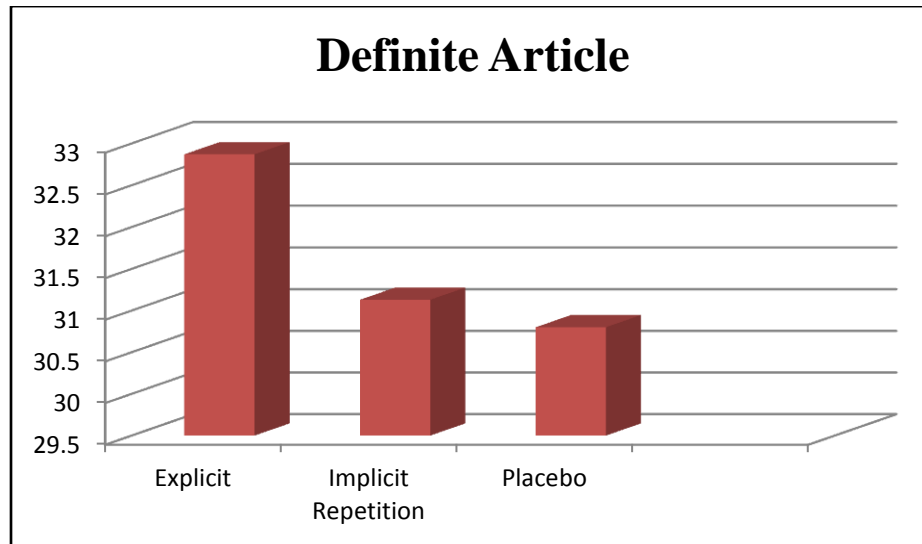


Figure 1. Group Means on Definite Article

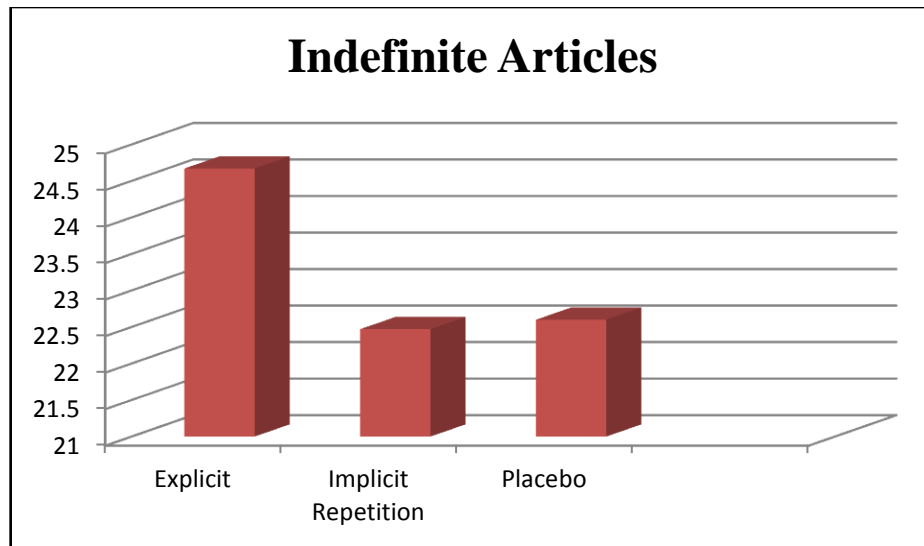
### ***Analysis of Results on Indefinite Articles***

In order to answer the second research question, descriptive statistics regarding the experimental and control groups was calculated first. The summary is given in Table 2.

**Table 2**  
**Descriptive Statistics on Indefinite Articles**

	N	Mean	Std. Deviation	Minimum	Maximum
Experimental Group1 (Explicit)	15	24.67	1.447	22	27
Experimental Group2 (Implicit)	15	22.47	1.598	20	25
Control Group	15	22.60	3.158	14	26

The minimum score was 14 belonging to the control group and the maximum score was 27 belonging to the experimental group 1. As Table 2 shows, the experimental group 1 who received explicit computer-mediated corrective feedback with the mean scores of 24.67 significantly outperformed the experimental group 2 and the control group with the mean scores of 22.47 and 22.60 respectively. The mean scores of the experimental group 2 and the control group didn't differ significantly. The differences between the groups' mean scores are represented in the following figure.



**Figure 2. Group Means on Indefinite Articles**

In order to investigate the effect of asynchronous computer-mediated corrective feedback on increasing the correct use of indefinite articles, a one-way ANOVA was calculated. The results of ANOVA showed statistically significant difference at the  $p=.05$  level of significance for the three groups in this study:  $F(2, 42) = 4.6, p = .015$ . Additionally, to find out where the difference(s) lie regarding the mean scores of the three groups, post-hoc comparisons through the Turkey HSD test were carried out. Following table summarizes the results of post-hoc tests.

**Table 3**  
**Results of Post-hoc Tests on Indefinite Articles**

Corrective Feedback	Corrective Feedback	Mean Difference	Std. Error	Sig.
Experimental 1 (Explicit)	Experimental 2 (Implicit)	2.200*	.806	.025
Experimental 1 (Explicit)	Control Group	2.067*	.806	.037
Experimental 2 (Implicit)	Experimental 1 (Explicit)	-2.200*	.806	.025
Experimental 2 (Implicit)	Control Group	-.133	.806	.985
Control Group	Experimental 1 (Explicit)	-2.067*	.806	.037
Control Group	Experimental 2 (Implicit)	.133	.806	.985

\*. The mean difference is significant at the 0.05 level.

Table 3 shows that the mean differences between the experimental group 1 ( $M=24.67$ ,  $SD=1.447$ ) and the experimental group 2 ( $M=22.47$ ,  $SD=1.598$ ), and the experimental group 1 ( $M=24.67$ ,  $SD=1.447$ ) and the control group ( $M=22.60$ ,  $SD=3.158$ ) were significant with the levels of significance of .025 and .037 respectively. There was no significant difference between the experimental group 2 and the control group because the level of significance was found to be .985.

One of the main goals of this study was to investigate the probable effectiveness of asynchronous computer-mediated corrective feedback—explicit/ implicit, via e-mailing on enhancing the correct use of definite and indefinite articles. Although previous research mostly supports the efficacy of corrective feedback on improving grammar accuracy (e.g., Lyster & Ranta, 1997; Compillo, 2003), the results of the present study both negate and support this tenet.

Research question 1 dealt with the investigation of whether asynchronous computer-mediated corrective feedback could increase the correct use of definite article, i.e. *the*. Results of the one-way ANOVA on the posttest revealed no statistically significant improvement for the experimental groups over the control group.

Research question 2 dealt with the investigation of whether asynchronous computer-mediated corrective feedback could increase the correct use of indefinite articles, i.e. *a* and *an*. Results of the one-way ANOVA on the posttest revealed that the experimental group 1 who received explicit corrective feedback significantly outperformed the experimental group 2 who received implicit repetition corrective feedback and the control group. But the experimental group 2 did not show statistically significant improvement over the control group.

With respect to the first research question, the findings proved to be controversial compared to the current view on the effectiveness of computer-mediated corrective feedback as no statistically significant results were found regarding increasing the correct use of definite article for the experimental groups over the control group. Apparently, the findings are in line with an earlier view held by Truscott (1996) claiming that “grammar correction has no place in writing courses and should be abandoned” (p. 328). But by looking at recent studies (e.g., Sheen, 2007; Lee, 1997) and also the findings of the second research question, it would be wrong to generalize these findings to all aspects of language learning and corrective feedback as there is ample evidence confirming the applicability and efficacy of corrective feedback on grammar improvement.

Findings of the first research question can be accounted for if we look at Persian and English contrastively. Generally, Iranian EFL learners are already familiar with indefinite articles. For example:

Persian: /man yek ketab va yek sib daram. ketab ra doost daram. /

Transliteration: (I a book and an apple have. Ø book like I.)

English translation: (I have a book and an apple. I like the book.)

By looking at these examples, it becomes apparent that indefinite articles are already present in Iranian interlanguage and they can positively transfer them into their target language thus benefiting from the corrective feedback explicitly provided by the teacher. Contrary to indefinite articles, English definite article is not present in Persian, as it is shown in the aforementioned example by the sign Ø. Thus, learners might have negatively transferred incorrect structures into their target language. Accordingly, following reasons may as well account for the controversial results. First, definite article might require deeper levels of processing than indefinite articles as it should be acquired after indefinite ones and is not present in learners' interlanguage. Second, the treatment that both experimental groups received might have not been effective in enabling them to apply the correct use of definite article in different testing instruments. Third, since by

answering the items of indefinite articles, the definite article items automatically revealed themselves, the control group might have successfully drawn on their previous knowledge on indefinite articles to answer definite article instruments. Fourth, the participant of this study might have had previous experiences in learning EFL affecting the testing results. Fifth, psychological factors might have affected their performance on the test. It can be claimed that, reminding learners of their mistakes might have acted as psychological barriers to their uptake of teacher-provided feedback resulting in inefficacy of the treatment. On the other hand, the control group might have interpreted their writings as perfect as they didn't receive any feedback.

With respect to the second research question, explicit corrective feedback proved effective in drawing learners' attention to the differences between their output and target norm. Therefore, findings of the second research question, as far as explicit corrective feedback is concerned, support Schmidt's (1990) Noticing Hypothesis in enabling learners to notice the gap resulting in the improvement of grammar accuracy because indefinite articles are already present in Iranian EFL learners interlanguage. Accordingly, superiority of explicit corrective feedback in increasing the correct use of indefinite articles by Iranian EFL learners further supports St. John and Cash (1995) findings on the efficacy of corrective feedback via e-mailing on increasing structural accuracy of written output. This superiority can be due to various factors. First, Iranian EFL learners generally tend to rely on their teachers to provide them with correct structures when they make a mistake because the main teaching method in this institute is still reminiscent of Audio Lingual Method (ALM). In this sense, they are most responsive when teachers locate the error, correct it, and require them to modify their language. Second, they tend to overlook teacher-provided corrective feedback, especially on their writings, when the incorrect structure is indirectly brought to their attention. Third, they tend to use erroneous structures less frequently for which teachers provide some clues and they fail to apply them correctly.

Additionally, with respect to the aforementioned reasons, the experimental group 2 who received implicit corrective feedback showed no significant improvement compared to the control group. This could be due to a variety of reasons. First, the experimental group 2 simply failed to notice the teacher-provided corrective feedback as the participants didn't receive any information on the formal aspects. Second, the bolded uppercase words might have misled them into wrongly correcting and changing the word itself or adding unnecessary words without realizing incorrect parts. Third, due to the fact that the participants had low proficiency, implicitly requiring them to correct their errors might have demanded deeper levels of processing than correcting explicitly which they might lack at this stage. Fourth, as indefinite articles should be mastered prior to definite article, the control group might have already been familiar with them and answered the testing instruments by simply putting appropriate indefinite articles, thus, neutralizing the efficacy of implicit corrective feedback.

## Conclusion

In this study, we assessed the impact of asynchronous computer-mediated corrective feedback on increasing the correct use of indefinite and definite articles. On the basis of the results, it became evident that the explicit corrective feedback had significant effect on increasing the correct use of indefinite articles but failed to increase the correct use of definite article. In the same sense, implicit corrective feedback didn't have any significant effect on increasing the correct use of definite and indefinite articles over both the experimental group 1 and the control group. The findings of the present study also provide further implications as to the efficacy of computer-mediated corrective feedback as a pristine searching medium on different aspects of language grammar. However, some limitations are attributed to this study. First, the level of proficiency was elementary, and it is possible that more proficient learners would have performed differently. Second, the overall teaching method at the ILI, i.e. a modified version of ALM, may have

affected the results. Finally, it should be admitted that most previous research on the corrective feedback and positive contributions to grammar accuracy improvement and in particular definite/indefinite articles has been in the forms of written, oral, and chatting. Thus, generalizations to asynchronous computer-mediated via e-mail especially in EFL environments should be done with great care.

In conclusion, despite these limitations, it is believed that the findings of this study are encouraging as technology has been finding its way into pedagogical environments. Additionally and with respect to the controversial results of the present study, it stands to reason that there is still plenty of room for further research in this field.

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## About the Authors



**Seyyed Behrooz Hosseini** is a M.A. student majoring in TEFL at IAU South Tehran Branch. He is interested in CMC and e-learning.  
[sbehroozh1970@yahoo.com](mailto:sbehroozh1970@yahoo.com)

**Esmail Faghih** is a professor of Teaching English as a Foreign Language (TEFL) from the University of Illinois, currently teaching at IAU South Tehran Branch. Prof. Faghih has written, published, and translated numerous books and articles.  
[e\\_faghih@azad.ac.ir](mailto:e_faghih@azad.ac.ir)

## Appendix A

Lyster &amp; Ranta's (1997) Categories of Corrective Feedback

Corrective Feedback Type	Definition	Example(s)	Nature of Error Indicated	Targetlike Reformulation Provided	Elicited Output
<b>Explicit Error Correction</b>	Explicit provision of the targetlike reformulation	You should say visited.	Yes	Provided directly	None or repetition
<b>Metalinguistic Feedback</b>	Comments, information or questions (that may or may not contain metalanguage but do not include the reformulation) related to the ill-formedness of the utterance	There's a mistake.	No	No	Identification of error and/or reformulation
		It's past tense.	Yes	Provided indirectly through metalinguistic hint at correct reformulation	Reformulation
		Did you use the past tense?	Yes	Provided indirectly through metalinguistic question concerning rule governing reformulation	Metalinguistic response, yes/no response, or reformulation
<b>Elicitations</b>	A prompt for the learner to reformulate	Try that again.	No	No	Reformulation
		How do we say that in the past tense?	Yes	No	Reformulation
		Yesterday we ...	Sometimes	No	Reformulation
<b>Repetitions</b>	Repetition of all or part of the utterance containing the error, often accompanied by a change in intonation	Yesterday we visit my aunt.	Sometimes	No	None or repetition
<b>Recasts</b>	Implicit reformulation of all or part of the learner's utterance	Yesterday we visited my aunt.	Yes	Reformulation provided	Repetition
		I visited my aunt last week.	Yes	Reformulation provided	Repetition
<b>Translations</b>	Target language translation of unsolicited use of the L1.	***	Yes	Reformulation provided	Repetition
<b>Clarification Requests</b>	An utterance indicating a problem in comprehension, accuracy or both.	Pardon?	No	No	Repetition, reformulation, or meaning elaboration

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**Editor's Note:** Adoption of e-learning requires information age skills. This study is to determine if formal instruction in Information literacy and digital skills are required to optimize learning.

## **Information Literacy: A Step Towards Moving College Students to the e-Learning Environment.**

**Zuhrieh Shana, Ahmed Dabbagh**  
United Arab Emirates

### **Abstract**

In recent years, there has been a growing advocacy for information literacy (IL) and digital literacy in higher education in general, and in an e-learning environment in particular. In order to support the adoption of e-learning at Ajman University of Science and Technology (AUST), the goal of the study was to measure the level of information/digital literacy skills of new education major students, at, before, and after the IL/digital training sessions. Accumulated grade point averages (AGPA) for both groups were compared after graduation.

Scores were compared; the results of these treatments confirmed that a one-shot session of information/digital literacy training is insufficient to make a significant difference and students who had more than one session gained more, performed better on assignments and the post-test, and achieved a higher accumulative grade point average (AGPA).

The results of this study are expected to provide a basis for designing and delivering an online tutorial or a regular course on information/digital literacy. An introductory information literacy course is described and principles behind the preparation of the course are discussed.

**Keywords:** Information literacy, digital literacy, e-learning, e-learner, library instruction, library skills, electronic research, Internet research skills, research skills, higher education.

### **Introduction and Background**

In this era of speedy change students are required to be information literate and need considerable amounts of information in order to survive. As a current UNESCO document (2008) affirms, "increasingly, the concept of information literacy is considered as crucially important to enable people to deal with the challenge of making good use of information and communication technology"(Horton, 2008: 3). Generally, this is not the case especially in developing countries. Thus, the fact that today's students have grown up in a global digital age, does not guarantee that they are skilled information hunters and users.

College education is the most information-rich experience in a student's life. As IL/digital literacy researcher has observed, "Within today's information society, the most important learning outcome for all students is their being able to function as independent lifelong learners. The essential enabler to reaching that goal is information literacy."(Breivik, 2000, online). In spite of this fact, researchers such as Bailey et al. (2004) confirmed that a growing number of high school graduates are entering higher education institutions unprepared academically for college-level work (Foster, 2006).

Furthermore, the changing economy makes it more of a requirement that our students can use IL/digital literacy skills to solve problems, collaborate, and create. To prepare our students to be more skilled, better informed and well equipped for the realities of their professional and personal lives, we must teach them the needed IL/digital literacy skills.

Consequently, the 21st century challenges educators to prepare learners to survive information overload. Murray (2008) acknowledged this fact by stating that "21st century students must be

able to purposefully access information from a variety of sources, analyze and evaluate the information and then integrate it to construct a personal knowledge base from which to make intelligent decisions” (p.36). Hence, the ever-developing information environment demands school IL/digital literacy curriculum.

Digital literacy is defined by Glister (1997) as "a set of skills to access the Internet; find, manage and edit digital information; join in communications; and otherwise engage with an online information and communication network. In simple terms, digital literacy is the ability to properly use and evaluate digital resources, tools and services and apply it to their lifelong learning process." (p. 290)

On the other hand, information literacy has been defined as “the process of acquiring knowledge of attitudes towards and skills in information, as a major determinant of the way in which people exploit reality, develop, live, work and communicate in an information society” (Marais, 1992: 75). It can also be defined as a group of abilities that a person can make use of “to cope with and to take advantage of, the unprecedented amount of information which surround. .. us in our daily life and work” (Candy, 1994: 284); these skills and abilities formulate the foundation of lifelong learning. Thus, Ajman University of Science and Technology has become more aware of the urgency to fulfill this identified need and the increasing importance of IL/digital literacy skills.

While a considerable amount of research has been done on integrating IL/digital literacy into classrooms in different parts of the world, very little research has been done in the Arab region. Thus, in an effort to integrate IL/digital literacy skills into the AUST’s curriculum, this institutional research intended to provide the foundation for an IL/digital literacy skills course. This course can be integrated into curriculum, especially into the general education or university requirements.

## **Goals of the study**

The goal of this study is to compile and verify data on the IL/digital literacy skills of undergraduate students entering AUST and declaring Education as a major, in order to grant more appropriate services, in addition to providing AUST University with reliable data to support recommendations for the integration of IL/digital literacy into the university curriculum.

## **Objectives of the study**

1. To determine the levels of IL/digital literacy of the first-year undergraduate Education students.
2. To explore the effectiveness of IL/digital literacy training in helping freshmen education students to achieve basic IL/digital literacy level that will ensure a stable foundation for optimal learning conditions.
3. Enhance and promote the IL/digital literacy skills of both staff and students and raise awareness of electronic resources.

## **Research Questions**

This study seeks to measure, compare and analyze the level of IL/digital literacy of first-year students enrolled in the college of education before and after taking the training sessions. More specifically, the following research questions are addressed:

What are students’ entries in information and digital skills upon admission to the college of education at AUST?

What IL/digital literacy training do we need and how can faculty of education at AUST contribute to that?

Does IL/digital literacy make a difference to students’ academic success and retention?

### **Research Design**

According to Patten (1997), the current study of information/digital session(s) development may be classified as evaluation research. This instructional program is seen as a research treatment with independent and dependent variables. The independent variable for this study is the IL/digital literacy curriculum while the dependent variable is the student achievement: measured by learner involvement in and completion of the IL/digital literacy curriculum, and self-reporting of skills level and attitude.

### **Research Hypothesis**

If an IL/digital literacy curriculum is established to teach AUST students, then they will be prepared to search for and analytically evaluate information, as well as eventually incorporating these resources into their coursework. In addition, they will be able to create, present, share and reflect on various types of information in masterful, meaningful and personal ways.

### **Literature Review**

Corporations and academic institutions worldwide, including the Middle East, have adopted e-learning and implemented learning management systems (Lasrado, 2009). This fact is especially true for the Gulf countries. Gulf Cooperation Council (GCC) countries are facing the challenge of creating sustainable modernizing plans in the education sector (Robinson and Ally, 2009).

Moreover, tracking the impact of the emerging global information and computer technology in developing countries, UNESCO (2007) reinforced that Higher education in the Arab States is presently undergoing rapid reforms. It stated that “Arab higher education is undergoing drastic change and transformation due to the forces of globalization and the dynamics of the twenty-first century. Perhaps the most urgent area besides funding is the quality of higher education (HE) and teaching methods”. Arab countries like the UAE that have already made a good start in e-learning. Guessoum confirmed that by stating “With its state-of-the-art digital infrastructure, the UAE has set the stage for rapid advances in e-learning while others remain at the concept stage” (2006).

In spite of all the enthusiasm for the effectiveness of e-learning, online learners remain reluctant and limited. The individuals that are most likely to benefit from e-learning are those with high information and communication technology (ICT) skills; persons with lower levels of ICT have a lower chance of being an efficient e-learner. Therefore, there is a clear need for a preparatory training and ICT skill upgrading to prepare the low-skilled students for the e-learning environment (Kember et al., 2001)

This emphasizes the importance of IL/digital literacy as a pre/co- requisite for e-learning environment. Therefore, it is highly recommended to incorporate “generic skills model” into freshman/first-year student’s knowledge base to the bridge the gap between their “existing skills” and “required skills”. Consecutively to help them acquire university level study approach in semester one, year one of their study program. This also will help enhancing their readiness for online learning and “meet [the] challenges and adopt positive learning skills that [shape] their entire learning experience” (Nelson et al., p. 3)

So, the need to study how the issue of IL/digital literacy is dealt with in AUST is vital given the nature of its mission. This paper proposes the design and development of IL/digital literacy course and resources that meet the unique needs of AUST’s students.

## Methodology

### *Participants*

Two groups of AUST's education students, in their 1st year of study, were trained to upgrade their information skills. The first training intervention, group one, were exposed to a four hour-training session, while the second training intervention, group two, were taught information/digital literacy as a practical application of a lower level of an educational technology course (15 two hour-sessions). Students took an identical pre-test and post-test. Scores were compared; the results of these treatments confirmed that one information literacy training session is insufficient to make a significant difference and students who had more than one session gained more and performed better on assignments and the post-test.

### AUST

The Boyer Commission on Educating Undergraduates in the Research University called for a first-year experience to provide stimulation for "intellectual growth and a firm grounding in inquiry-based learning" (2001, p. 12). Information literacy fits well with this educational goal.

As the first private university in UAE, AUST faces its share of challenges and therefore, has to emphasize the importance of IL/digital literacy to promote e-learning as an essential element of its educational system. AUST's vision of learning through technology also emphasizes the great urgency given to incorporating IL/digital literacy into university requirements. Consequently, causes an increase in the AUST institutions' pressure for the eLearning adoption and thus implementation of a learning management system (LMS).

One of the basic challenges with making e-learning successful is managing the courses. Thus, the ultimate goal of implementing a course management system (CMS) such as Moodle is to help AUST promotes efficiency while moving towards innovative e-learning mode. This goal can be achieved by supporting instructional innovation with learning technology progress. Additionally, due to the fact that Moodle is based on the constructivist theory, it emphasizes the significance of AUST's outcome-based learning approach. Moodle also enables the delivery of educational contents/resources to students at anytime, anywhere (24/7 timeframe) and to increase the interactivity of students through engaging them with their classmates and instructors in a more two-way, remote dialog via internet and thus become lifelong learner.

According to its vision/mission statement, AUST operates on the principle that well effective educational institutions generate results that completely overcome the effect of learner traditional backgrounds (AUST's official web site). Therefore, this paper presents a preliminary experience of actively seeking to equip students with additional IL/digital literacy skills to help them access, assess and employ different information from different resources.

### *Instrument*

A survey in the form of a pre-test and post-test was designed and administered to incoming freshmen at the AUST Fujairah Campus. The survey was based on ACRL Information literacy Competency Standards for Higher Education. Its main aim was to be used as a pre-test to measure levels of IL/digital literacy of students entering their first-year undergraduate program in Education. It also aims to help faculty of education at AUST document IL/digital literacy skills level for first year students and to pinpoint areas for improvement

This survey was developed by the researcher and pilot-tested by a group of professionals. Revisions to the instrument were made, based on the pilot-test results, followed by a distribution of 100 pre-tests to randomly-selected education major first-year students. The survey was administered at the end of the first semester of the 2005/2006 school year. 69 usable instruments were returned for a response rate of 69%. They were divided into two groups group one (31) and

group two (39). Group one had one session of information/digital literacy while group two had a semester long of training. 2 hours per week for 15 weeks training

The pre/post-test was intended to indicate the usefulness of the session/course. The students had to score their ability on a range of specific tasks in the following areas:

- Definition and expression of information need.
- Location and access of information
- Acquaintance: Available Resources [Materials and Services](#).
- Differentiation: [Books](#) from [periodicals](#) and [print from non-print source](#) citations.
- Utilization & Interpretation: [library catalogue](#) and [electronic databases](#) information.
- Comprehension: Library of Congress [subject headings](#), [call numbers and shelving](#).
- Usage: [Boolean Operators](#) "AND," "OR," and "NOT."
- Knowledge: [Basic types of information sources](#).
- Familiarity: Glossary of [library](#) and [Internet terms](#).
- Assessment of information
- Analysis, synthesis, organization and evaluation of information
- Use of information ethically
- Communication and presentation of information

Students scored “yes” if they had the skill, “no” if they did not have the skill or “unsure” if they were uncertain whether they had the skill and, if they wish, leave a comment on items. The measurement is for learning gain from start to finish of the IL/digital literacy material, not the total course "achievement" at the end of a course.

For participant unfamiliar with college and inexperienced in dealing with large amounts of information, information overload can be frustrating and aggravating. Therefore, in a structured manner, participants were guided through this process which ultimately leads to increasing skills in locating, evaluating and handling overloads of information and its incorporation in educational settings.

## Data Analysis and Finding

This study examines the current situation concerning the level of information skill of first year AUST students in the United Arab Emirates. The study investigates the factors affecting the demand for and provision of IL/digital literacy training and the potential for IL/digital literacy curriculum to cover most of the training provided. Statistical analysis was performed using Minitab version 14. The hypothesis is that the means are equal; the alternative hypothesis is that they are unequal.

The first step was to determine the IL/digital literacy knowledge and skills level before starting our interventions. So, it was very important to assess whether the means of two groups (G1 and G2) are statistically different from each other in the in pre-test score. For finding out the difference between the two groups (G1 and G2) mean pre-test scores, a One-way Analysis of Variance was used. The measure used in this analysis was the raw score of the IL/digital literacy survey (pre-test). Analysis of the mean scores shows that results were statistically equivalent. Therefore, there were no significant differences at the starting point of the study (Table 1).

**Table 1**  
**Pre test scores for G1 & G2**

Analysis of Variance:

Source	DF	SS	MS	F	P
Factor	1	0.091	0.091	0.12	0.734
Error	144	113.744	0.790		
Total	145	113.836			

Individual 95% CIs For Mean Based on Pooled StDev

Level	N	Mean	StDev	--+-----+-----+-----+---
Pre6	69	12.232	0.957	(-----*-----)
Pre7	77	12.182	0.823	(-----*-----)
				--+-----+-----+-----+---

Pooled StDev = 0.889      12.00   12.15   12.30   12.45

With a significance level of 95% ( $\alpha = 0.05$ ), the calculated value of F (0.12) is less than the critical value of F(3.84), so the hypothesis that there is no difference between the groups (G1 & G2) pre-test scores is accepted.

The next step was to decide whether there is an improvement in students' achievements during the training. This can be done by determining whether there was a statistically significant difference between the pre-test and post-test scores for students in the treatment group (G1) and the in the control group (G2).

For this, a one-way ANOVA on the difference between the mean pre-test and post-test scores for both groups was used. Analysis of the mean raw scores shows that, students in the group 1, which were exposed to a four hour training session showed moderate (not significant) improvement in overall test scores from the pre-test to the post-test, while students group 2 that had semester-long training in the IL/digital literacy curriculum showed significant difference in overall test scores from the pre-test to the post-test. These differences are statistically significant at the 95% level of confidence (Tables 2 & 3).

**Table 2**  
**Pre and posttest for G1**

One-way Analysis of Variance:

Source	DF	SS	MS	F	P
Factor	1	2.666	2.666	3.02	0.087
Error	68	59.977	0.882		
Total	69	62.643			

Individual 95% CIs For Mean Based on Pooled StDev

Level	N	Mean	StDev	----+-----+-----+-----+--
Pre12	31	12.290	0.938	(-----*-----)
Post12	39	11.897	0.940	(-----*-----)
				----+-----+-----+-----+--

Pooled StDev = 0.939      11.70   12.00   12.30   12.60

With a significance level of 95% ( $\alpha = 0.05$ ), the calculated value of F (3.02) is less than the critical value of F (3.92), so the decision is to accept the null hypothesis.

**Table 3**  
**Pre and posttest for G2**

One-way Analysis of Variance:

Analysis of Variance

Source	DF	SS	MS	F	P
Factor	1	3920.63	3920.63	3802.60	0.000
Error	76	78.36	1.03		
Total	77	3998.99			
Individual 95% CIs For MeanBased on Pooled StDev					
Level	N	Mean	StDev	-----+-----+-----+-----	
Pre2	39	11.897	0.940	(*	
Post2	39	26.077	1.085		*)
				-----+-----+-----+-----	
Pooled StDev =		1.015	15.0	20.0	25.0

With a significance level of 95% ( $\alpha = 0.05$ ), the calculated value of F (3802.60) is more than the critical value of F (3.92), so the decision is to reject the null hypothesis.

In addition, it was crucial to compare the achievement improvement in both groups to validate the efficacy of the treatment by verifying if there is a significant difference between the control (G1) and treatment group (G2) on the post-test. For this, a one-way analysis of variance on the difference between the mean post-test scores for both groups was used. This analysis shows that the overall mean post-test scores for the treatment and control group are significantly different (4).

**Table 4**  
**(G1) and (G2) on the post-test**

Analysis of Variance

Source	DF	SS	MS	F	P
Factor	1	1064.61	1064.61	1061.67	0.000
Error	68	68.19	1.00		
Total	69	1132.80			
Individual 95% CIs For Mean Based on Pooled StDev					
Level	N	Mean	StDev	-----+-----+-----+-----	
G1	31	18.226	0.884	(-*)	
G2	39	26.077	1.085		(*-)
				-----+-----+-----+-----	
Pooled StDev =		1.001	20.0	22.5	25.0

With a significance level of 95% ( $\alpha = 0.05$ ), the calculated value of F (1061.67) is more than the critical value of F (3.92), so the decision is to reject the null hypothesis

It was also imperative to check the effect of the IL/digital literacy skills gained on achieving a higher accumulated grade point average (AGPA). The first step was to determine whether there was a statistically significant difference between the G1 and G2 in their overall accumulative grade point average score (AGPA) before starting our interventions. The rationale of this analysis was to exclude their AGPA from being a factor causative to their overall final AGPA scores.

Given that the participants were in the first semester, their high school scores were gathered from Record and Admission Department and compared. A one-way analysis of variance was used for the analysis. The result shows that the mean scores were statistically equivalent. Therefore, there were no significant differences at the starting point of the study (Table 5).

The second step was to compare the achievement improvement in both groups to validate the efficacy of the IL/digital literacy training (treatment). The two groups were followed until graduation and their AGPA were compared. Results also showed that IL/digital literacy has a significant effect on students AGPA. For this, a one-ways ANOVA on the difference between the AGPA's mean of the two groups (G1 & G2) was used. Results showed that IL/digital literacy has a significant effect on students AGPA and that there were significant differences of the AGPA's means a graduation (Table 6).

**Table 5**  
**AGPA of (G1 and G2) before the treatment**

One-way ANOVA: G1, G2

Source	DF	SS	MS	F	P
Factor	1	5.89	5.89	0.83	0.367
Error	58	413.96	7.14		
Total	59	419.85			

S = 2.672 R-Sq = 1.40% R-Sq(adj) = 0.00%

Individual 95% CIs For Mean Based on Pooled StDev

Level	N	Mean	StDev	-----+-----+-----+-----+
G1	30	72.383	1.981	(-----*-----)
G2	30	71.757	3.217	(-----*-----)
				-----+-----+-----+-----+
		71.40	72.10	72.80 73.50

Pooled StDev = 2.672

With a significance level of 95% ( $\alpha = 0.05$ ), the calculated value of F (0.83) is less than the critical value of F (4.00), so the decision is to accept the null hypothesis.

**Table 6**  
**AGPA of (G1 and G2) at the end of their study program**

One-way ANOVA: G1, G2

Source	DF	SS	MS	F	P
Factor	1	12.996	12.996	66.03	0.000
Error	55	10.826	0.197		
Total	56	23.822			

S = 0.4437 R-Sq = 54.56% R-Sq(adj) = 53.73%

Individual 95% CIs For Mean Based on Pooled StDev

Level	N	Mean	StDev	-----+-----+-----+-----+
G1	28	2.7607	0.3838	(----*----)
G2	29	3.7159	0.4946	(----*----)
				-----+-----+-----+-----+
		2.80	3.15	3.50 3.85

Pooled StDev = 0.4437

With a significance level of 95% ( $\alpha = 0.05$ ), the calculated value of F (66.03) is more than the critical value of F (4.00), so the decision is to reject the null hypothesis.

## Discussion of Results

Integrating an IL/digital literacy curriculum is in the hub of this research paper. The main focus is on equipping learners for success during college experience and preparing them for any path after graduation. The result of this study supports the importance of information literacy investments in schools and has clear suggestions for educating e-learners about information/digital literacy.

This result confirms the international declaration of information/digital literacy skills as vital component of today's world that needs to be addressed. This was documented in the "Information for All Programme" (UNESCO, 2005), and "Towards an Information Literate Society" (The Prague Declaration, 2003).

The results of the study's treatments confirmed that one-shot of information/digital literacy training session is insufficient to make a significant difference and students who had more than one session gained more and performed better on assignments, the post-test and achieved a higher accumulative grade point average (AGPA).

Consequently, an introductory information literacy course has been described and principles behind the preparation of the course have been explained.

## IL/Digital Literacy Course

### **General Purpose**

The main suggestion of the research result is to add IL/digital literacy course to AUST undergraduate curriculum. An IL/digital literacy course and recourses is developed to include the identified IL/digital literacy skills and concept which are tailored to the research target population

### **Course Description**

The course will address helping AUST students navigate through today's information loaded environment with the vital skills to create new knowledge, to develop critical thinking skills, and to formulate decisions that will facilitate the transition to a sustainable future. Course activities are based on ACRL Information literacy Competency Standards for Higher Education.

### **Challenges & Questions to Address:**

The course is designed to address the following questions:

- What are the key skills of IL/digital literacy that AUST students need to develop in the Information Age?
- What are the best methods to help them develop and deliver these IL/digital literacy skills? Who? Where? How?
- What effect does the IL/digital literacy curriculum have on the performance and attitudes of the participants?

### **Suggested Curriculum Model:**

Students are expected to develop IL/digital literacy skills through a core course on IL/digital literacy which provides a base of knowledge and skills. The information problem-solving and help-seeking models will be used in planning curriculum course activities.

### **Expected Outcomes:**

The proposed IL/digital literacy curriculum will produce the following benefits:

Help AUST students become more critical users of the Internet, Libraries and Databases and Learning management systems (Moodle)

Engage AUST students in the critical use of the resources-based e-learning environment, so they will be able to:

- Navigate through the vast quantity of information resources,
- Discover a range of 'tools' to reinforce the course content,
- Move towards e-learning for lifelong learning and education,
- Become better prepared for college, work, life and success.

## **Recommendation/Implication for Implementations**

The Results of this study confirmed that students are expected to develop information literacy skills through a core course on information literacy which provides a base of knowledge and skills. The information research-based, problem-solving and help-seeking models proved to be effective in planning curriculum units and activities.

Nevertheless, IL/digital literacy cannot be the formation of a particular course (Bundy, 2004); progress in students' learning of information literacy can be achieved through additional formal learning activities in other courses. These activities need to be integrated into the content, structure, and sequence of the discipline-specific curriculum.

Consequently, the results also support other investments in teacher professional growth, curriculum, and evaluation. Teacher training and educational change need to be in harmony with curriculum and assessment reform. In addition, the researchers are also hopeful that more research and development will be done in the area of IL/digital literacy's integration. The results attained from this research study demands a large-scale collaborative project.

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## About the Authors

**Dr. Zuhrieh Shanaa** is an Associate Professor in Educational Technology at the Faculty of Education at Al-Ain University of Science and Technology (AAU), UAE. She has been the Deputy Dean of Student Affairs at AAU since 2010.

In the past five years, she conducted several researches in the field of educational technology; designed and developed educational software as a part of a Research Agenda for Educational Reform for Student Success in UAE.

She possesses over 20 years of teaching, consulting, training and research experience in different academic institutions in USA, Saudi Arabia, Canada and the United Arab Emirates.

[zuhrieh.shanaa@aau.ac.ae](mailto:zuhrieh.shanaa@aau.ac.ae)

**Dr. Ahmed Dabbagh** has 17 years as senior technical and academic positions, working for international semiconductor companies, holding six international patents and co-author of a book entitled “intellectual property for electronic systems: an essential introduction”, iec 2007.

Dr. Dabbagh has membership in dvb-cpt, vsia standardizations and IEEE, and a professor in different known universities in UAE in the field of computer engineering and educational technology. I have intensive experience in the e-learning platforms, and the deployment of e-learning resources.

[dabbaghahmed@yahoo.fr](mailto:dabbaghahmed@yahoo.fr)

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**Editor's Note:** This is a useful expansion of communication models of the twentieth century to incorporate individualized learning, interactive multimedia, and social media.

## **Instructional Communication: Expansion in Communication Theory**

**Andrew A Nkom**  
Nigeria

### **Abstract**

Personal experience in classroom teaching as well as research in communication, had revealed that the communication models, particularly the Kemp model, used to indicate communication process in instruction, were inappropriate. Based on lapses as well as positive attributes of such models and on key concepts based on systems approach to instruction and having identified specialization as the best approach to training professional teachers, a new communication model, the Instructional Communication Concept (TCC) model was developed.

Both the communication model and the specialization approach formed the contents of an Instructional Communication Programme (TCP) which was field-tested in Instructional Communication Workshops (TCWs), covering the Nigerian education ladder. Findings from reaction questionnaires separately applied based on this ladder, confirmed the efficacy of both the communication model for instruction and the specialization approach to teacher education.

Based on these confirmations, the Professional Diploma in Education (PDE) programme was developed with eight specialization areas. Both its professional and academic status were confirmed by its approvals for national application, by the Nigerian teaching regulatory body, Teachers Registration Council of Nigeria (TRCN) and Senate of Ahmadu Bello University, Zaria respectively, in 2005.

The model, which proved its difference from mass communication models, provided the theoretical framework for developing the PDE programme. The model has therefore, given birth to a new type of communication such that Instructional Communication has qualified to be recognized as the fourth process type of communication. Process types of communication now include; Intrapersonal Communication, Interpersonal Communication, Mass Communication and Instructional Communication, which is specific to instruction. Its efficacy as a theoretical framework for training teachers has been confirmed by the PDE programme.

### **Introduction**

The formal link between communication in the use of the term as a process and instruction, can be traced to World War II. The mass media having been used to support the war effort, communications media technology came into classroom use, along with non-teacher media specialists. Starting with the technical engineering model, communication models were developed to try and explain the process involved in communication. These were mass communication process models, but they set a standard for developing communication models, with their visual illustrations of the process.

### **Communication as a process**

Communication is therefore, recognized as a process in the exchange or delivery of ideas or of information. On that basis, Bittner (1989) has identified three types of communication to include: intrapersonal communication; the exchange of information between human sensory organs and the brain, interpersonal communication; the interactive exchange of information between two or more persons and mass communication; the impersonal exchange or delivery of information to mass of people widely dispersed, at the same time.

### **Review of communication models**

As earlier observed, the engineering communication model as shown below, set off the effort leading to the three identified process models.

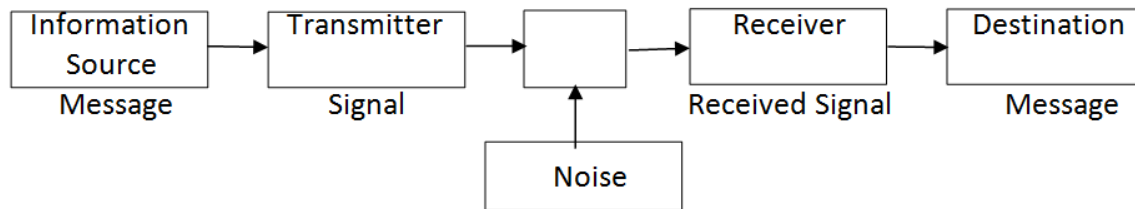
### **Engineering communication model**

TRANSMITTER → SIGNAL → RECEIVER

The engineering communication model showed the process of communication in its technical form. A transmitter sends out information as a signal, which is received by a radio or television set.

One of the earliest communication models developed in 1949, was the Shannon communication model (Anaeto, Onabajo and Osifeso: 2008)

### **Shannon communication model**



The communication process in this model, starts with a message from an information source. The message is then transmitted as a signal and is received by a receiver such as a radio or television set at its destination. Of significance to instruction in this model, is the noise factor.

The SMCR communication model, developed by Merlo in 1960 (AECT:1977) based on the Shannon model, separated source and message and replaced destination with a receiver component.

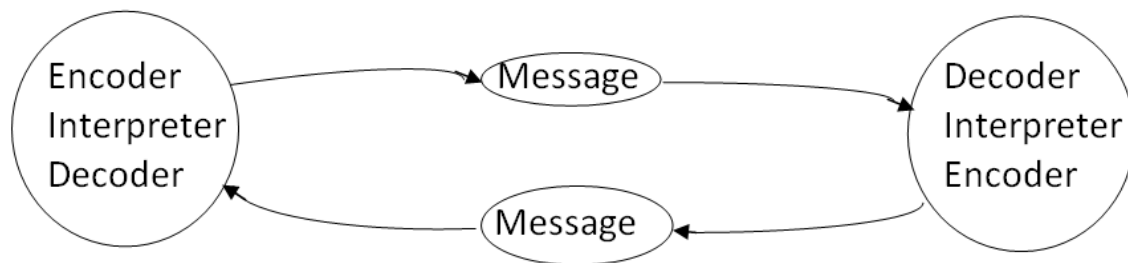
### **SMCR communication model**

Source	Message	Channel	Receiver
S	M	C	R
Communication Skills	Content	Seeing	Communication Skills
Attitudes	Components	Hearing	Attitudes
Knowledge	Treatment	Touching	Knowledge
Social System	Structure	Smelling	Social System
Culture	Code	Tasting	Culture

By this model, what is transmitted at source is what is received at the destination of the message. Source reflects the different content areas which are received as sent while message reflects how those contents are to be handled. Of significance to instruction is that, the model identified the use of all human senses as channels for communication.

The Schramm model developed in 1954, has encoder, interpreter and decoder on the one side and the reverse on the other (Anaeto, Onabajo and Osifeso: 2008).

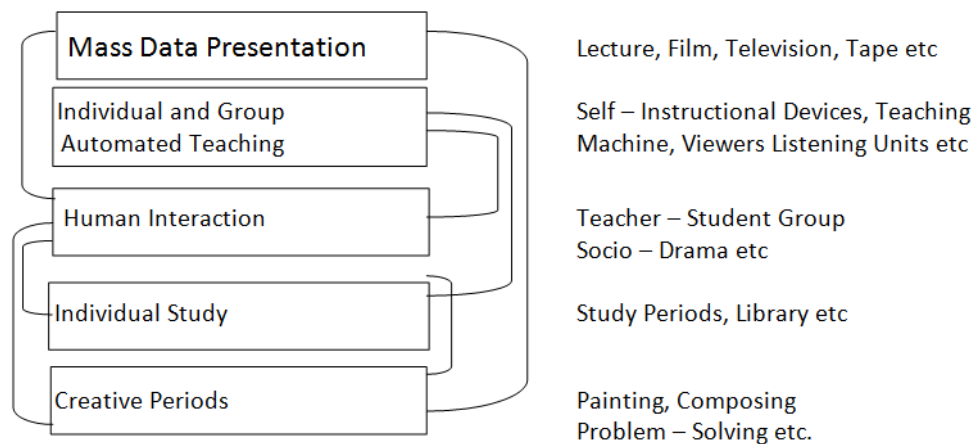
### Schramm communication model



Message links both sides, representing the sender and the receiver as in earlier models. The model, in reversing the order at the receiver end, suggested an interface in the communication process in interpersonal communication. Both sides then represent fields of experience which could be interpreted to refer to teacher and learner respectively. The aspects of interface and fields of experience are of significance to instruction.

The early systems or black box concept model, developed by Finn in 1961 (AECT:1977) is more directly related to instruction.

### Early systems or black box concept model

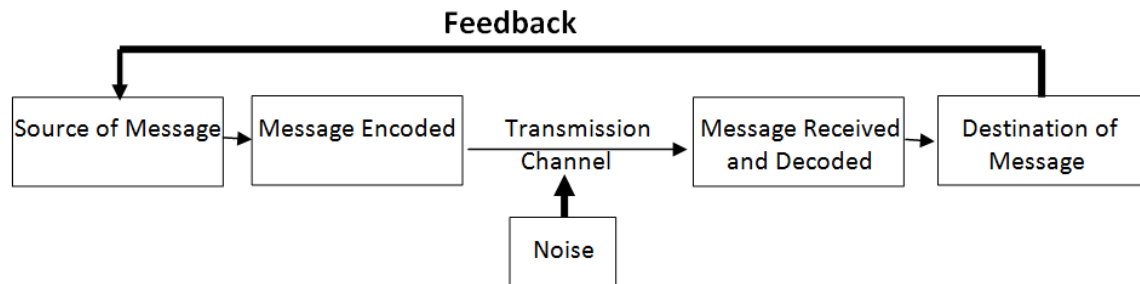


The model restricted itself to presentation. Modes of instruction include: the lecture; teacher-student small group instruction or teaching; and self-instruction or individual study. Self-instructional devices, teaching machines, viewers and listening units are linked to study periods and library and with such activities as painting, composing and problem-solving in the self-instruction mode. The lecture for mass data presentation for large group instruction is supported by film, television, tapes and so on.

The Shannon communication model was modified in the Kemp (1975) communication model to replace information source with more specific source of message, replace

transmitter with message encoded and to balance this with decoded and also more specific destination of message. The model is more specific about noise, as occurring at the transmission channel and has added a feedback component.

### Kemp communication model



This model is impersonal, one way in communication with delayed feedback and with noise restricted to the transmission channel.

### Technology in Instruction

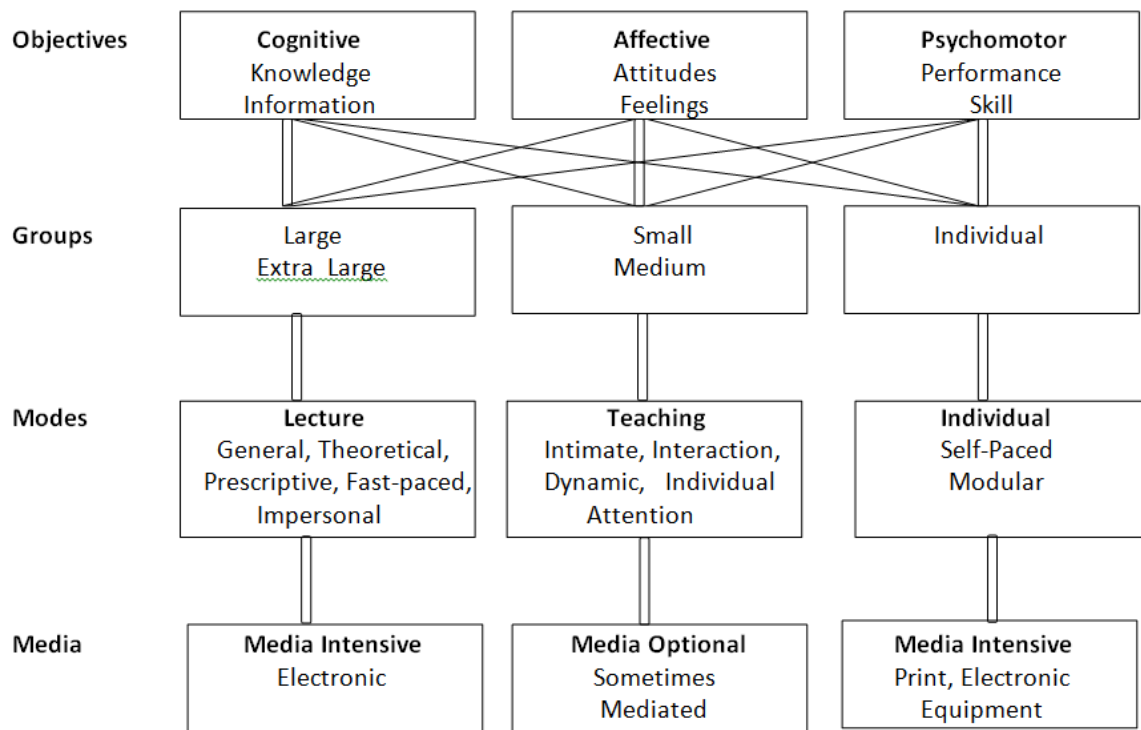
Technology had come into the classroom as audio-visual equipment when technology was seen simply as equipment or gadgets. The work in communication theory led to a change in perspective with technology being seen as a process, especially because instruction had already been identified as a science. Judd 1918 (in Brauner:1964) had observed that pedagogy as the science of teaching, relied upon results of all sciences whose facts had significance for education but from the point of view of education. This led to the development of the systems or scientific approach to instruction such that regardless of subject matter or age, instruction can be successfully replicated.

#### *Instruction in our context*

Instruction, as a process of exchange of meaning between teacher and learner, is an umbrella concept that covers the three main modes of instruction as already identified in the early systems or black box concept communication model. The lecture for mass data presentation in large groups, which originated from medieval universities, is still the mode of instruction used in university education. Teaching, for small group instruction which originated from Greco-Roman education and which has become the generic name for all those involved in instruction, is used at the lower levels of education where teaching should be interactive. Self-instruction or individual instruction for developing skills and for interaction with already prepared materials, which originated from the monitorial system of education in the 18th Century (Novak:1977), is used in learning situations, where the individual learns by himself/herself at her/his own pace.

Inter-relatedness in instruction is the link of four aspects, which also dictate modes of instruction and the related support media, as shown below. The lines linking objectives in domains and contact or group size, show the longest distances as being between cognitive and psychomotor domains, meaning that teaching should be carried out such that cognitive material should not be taught in individual settings in the sense that the lecture cannot be used to teach skills or that skills cannot be taught in large groups.

## Inter-relatedness in instruction

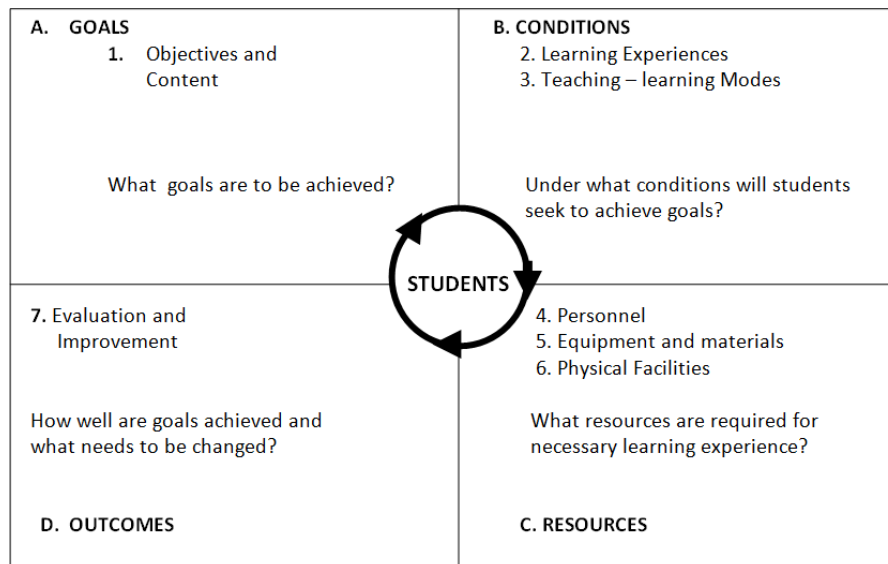


Nkom 2000

This inter-relatedness in the instructional setting indicates the choices that are available to the teacher. The perception of technology as a process and of instruction as a science gave birth to the systematic approach of instructional technology.

## Systematic approach of instructional technology

The model has specified four components.



**Brown, Lewis and Harclerod (1977)**

The model is a planning guide for instruction in the systematic or scientific approach such that when properly carried out, instruction would be successful. In the fact that this systematic or scientific approach covers all subjects, this is why the term instructional technology is often used interchangeably with general methods, as separate from subject methods.

## **Key Concepts in Instruction**

The discussed communication models such as the Kemp model, as mass communication models, are unsuited to providing the required theoretical framework for training teachers because they omitted key instructional concepts and practices. There was thus a need to develop a suitable process communication model that would cover the whole process of instruction, based on key instructional concepts. Literature has for instance, identified two vital concepts in instruction; perception and interaction. Emphasis is placed on perception because classroom communication is between two human minds; that of the teacher and that of each and every learner in the classroom. Sotto (1994) in confirmation, has observed that classroom communication involves an interface between schema or mental pictures; those of teacher and of each learner in the classroom.

The interactional nature of classroom communication has been captured by Eble (1976) who has observed that the centre of all teaching and learning is the interaction between teacher and learner. In its generic context, Curzon (1990:110) has described teaching as “an interactional process in which meaning is simulated through the sending and receiving of verbal and non-verbal messages.” These concepts are basic ingredients to instructional communication.

## **Development of Communication Model**

Research carried out and experience over the centuries produced a considerable amount of literature which, provided guidance for the development of a suitable communication model to also serve as theoretical framework for instruction, specifically for training teachers. As a starting point, Peters (1977) has observed, in recognition of the role of theory, that no teacher, even the most practically minded one, approaches his task without theory. However, according to him, the only real question is whether the assumptions upon which his practice is based are clear-headed or muddle-headed based on evidence or on prejudice. In other words, practice in teaching must have a theoretical base which in turn, must be based on something tangible or evident; theory and practice are thereby mutually related.

Teacher education, according to the Jesuits in the 16th Century AD (Curtis and Boulwood: 1965), should be anchored on the assumptions or principles that, to achieve thoroughness of learning, care must be taken in the preparation of the teacher and by methods actually employed in the classroom. Jesuit colleges proved the efficacy of this approach.

Contributions such as those by Kemp (1975), Novak (1977), Peters (1977), Bittner (1989), Curzon (1990) and Sotto (1994) among others, assisted in this process. Sotto (1994) identified interface as a component of this type of communication in the interaction necessary for learning to occur. He also identified perception as another component which personalized the communication process. Curzon (1990:109) provided emphasis for this interaction when he described this type of communication as “the exchange of meaning between teacher and students without which there can be no effective teaching or learning”.

The SMCR communication model had identified all the human senses as collectors of information. The Schramm communication model had recognized and demarcated the fields of experience of teacher and learner and the Shannon and Kemp communication models had identified the noise factor in the communication process. Along with all these contributions, the systems or scientific approach had identified the components of that system. These were the

contributions that combined to form the new communication model because they in turn form the essential principles and practices in classroom instruction.

Identified as the Instructional Communication Concept (TCC) communication model, in recognition of its classroom relevance and of the fact that the communication process is distinct and different from that in mass communication, the model is made up of five components including; communication flow, communication approach, communication model, the noise factor and the span of control. TCC has included the implementation component which the systems approach had omitted.

## Components of TCC

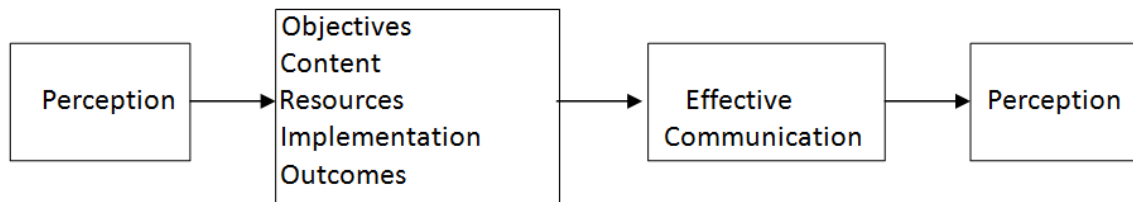
The components of TCC communication model are discussed below.

### **Communication flow**

The communication flow component provides an over-view of this communication process which starts from the teacher's perception and ends with the learner's perception in confirmation that communication is between two minds; that of the teacher and that of each and every learner in his/her classroom.

As is evident, the process covers instructional design, implementation and outcomes or evaluation as should be expected. All components from objectives to outcomes, if properly carried out, should result in effective communication, which then activates the learning process.

### **Communication flow**



Starting from teacher's perception, objectives determine all subsequent components in the systems or scientific approach. In determining how well all other components operate, objectives are used in this presentation to also include the other components. When this process is properly carried out, this gives assurance of effective communication leading to perception in the learner, thereby activating the necessary learning processes which every normal child has.

### **Communication approach**

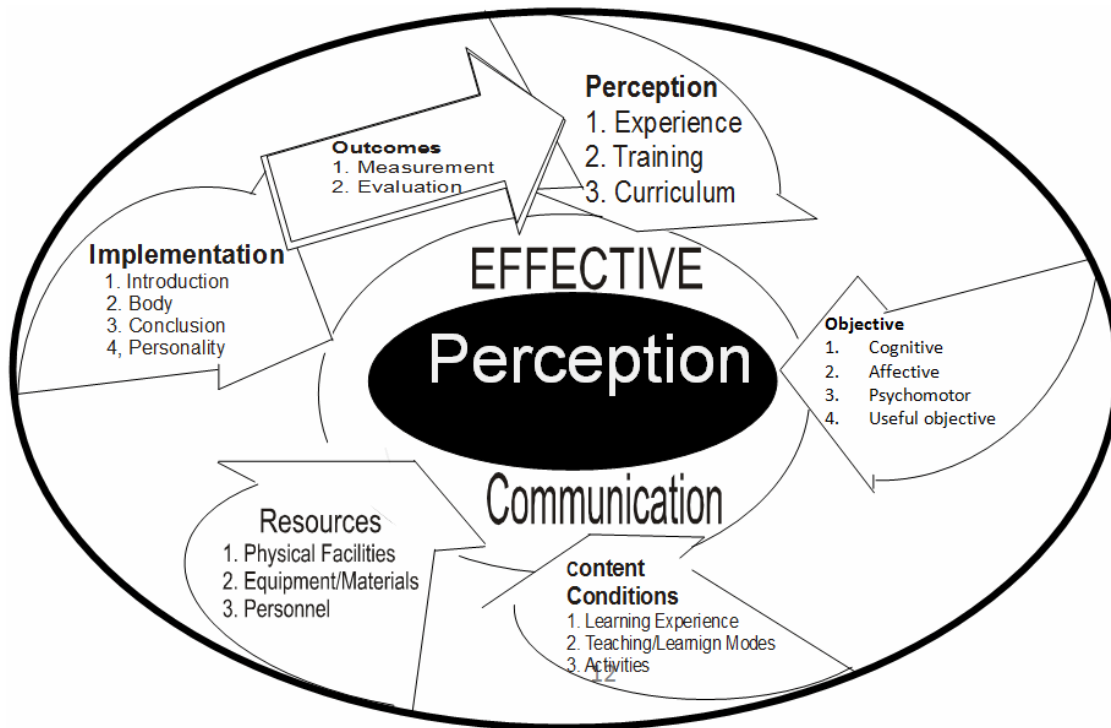
The communication approach component has six sub-components, including perception on the part of the teacher which sets off the process. Composed of nineteen items, these serve to provide more detail on the systems or scientific approach. Having included the implementation component, the approach provides details to serve as guidance to the teacher as to expectations for each sub-component. These expectations also serve to alert the teacher on factors that could constitute or be sources of noise.

The fourth item in objectives; that of useful objectives has often been ignored. Objectives are useful, especially on the side of the teacher, when they specify not only performance expected but also the condition in which it will be carried out, as well as the criterion or level of perfection required, which can be in terms of accuracy, speed, precision and so

on. Objectives provide more focused guidance for the learner and thereby assist the teacher in the evaluation process. The aspect of criterion is particularly important in skill learning in the psychomotor domain, when the teacher at training, should demand much higher standards, so as to get learners perform as expected in normal circumstances.

The following diagram expresses the communication process as an approach, where all sub-components act as collective contributors, to attain effective communication.

### Communication approach

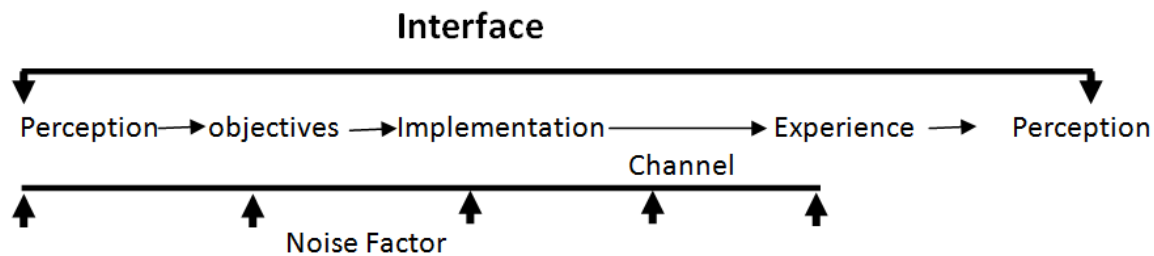


It is to be noted for instance in the communication approach, that the Resources sub-component in view of developments already discussed, involves much more than equipment, since it is made up of physical facilities, equipment and materials and personnel.

### Communication model

The communication model component shows as is to be expected, the actual process of this communication covering instructional design, implementation and evaluation. The distinct pattern of classroom communication as is evident, covers unique communication aspects as reflected in the model, including for instance, experience, which Peters (1977:12) has described as "learning's chief competitor as a modifier of behaviour."

The model shows relationships in the process and especially the aspects of experience, interaction or interface and interference or noise as this affects the process.

**Communication model**

Novak (1977) has also shown that the most important single factor that influences learning is what the learner already knows through experience. Sotto (1994) has, similarly, observed that the human brain processes information on the basis of information already available to it.

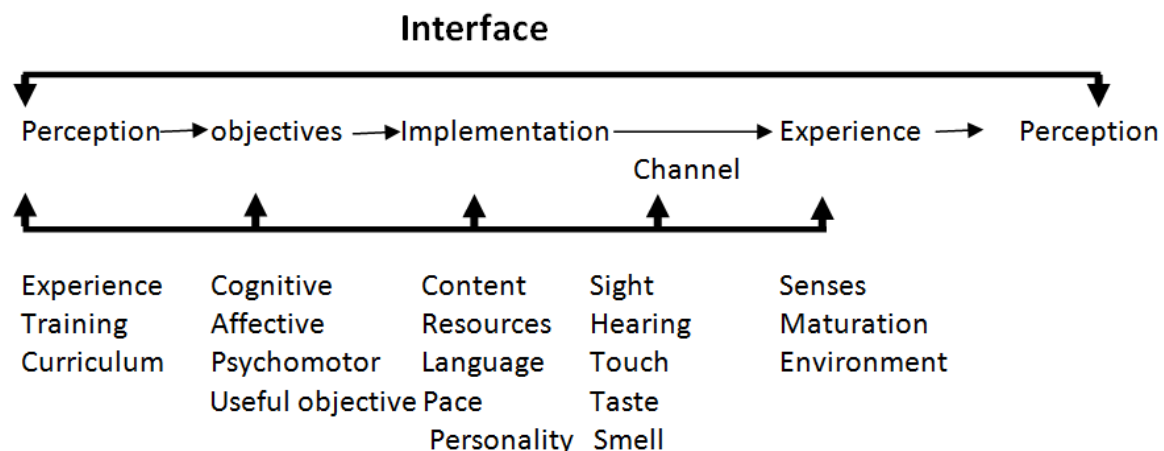
A second aspect is that of interface showing that communication can originate from both teacher and learner, thus making it two-way. The teacher provides information to which the learner can respond by comment or question in the attempt, as Sotto (ibid) has shown, to compare or align mental pictures.

The third aspect is the noise factor or interference, which is shown to be capable of occurring at each and every one of the steps in the communication process. In this case, objectives also, as already shown, cover all the other components which they activate, indicating that noise could occur in objectives as well as in content, resources, implementation and outcomes.

**Noise factor**

In the fact that the noise factor and span of control components are part of the communication process as shown in the communication model, the communication model has been used to highlight them.

The noise factor component elaborates and provides examples of what could constitute noise in the communication process and the diagram provides details as contained in the communication model.



Noise would act to prevent the attainment of the appropriate perception by the learner. As an example, from the teacher, perception depends on; prior general experience including basic education, quality of professional training and the specific aspect of the curriculum

to be taught. Noise could occur in each one of these that would affect the quality of teacher perception. In particular, noise could result from challenges in the sense organs of learners, as receptors of information.

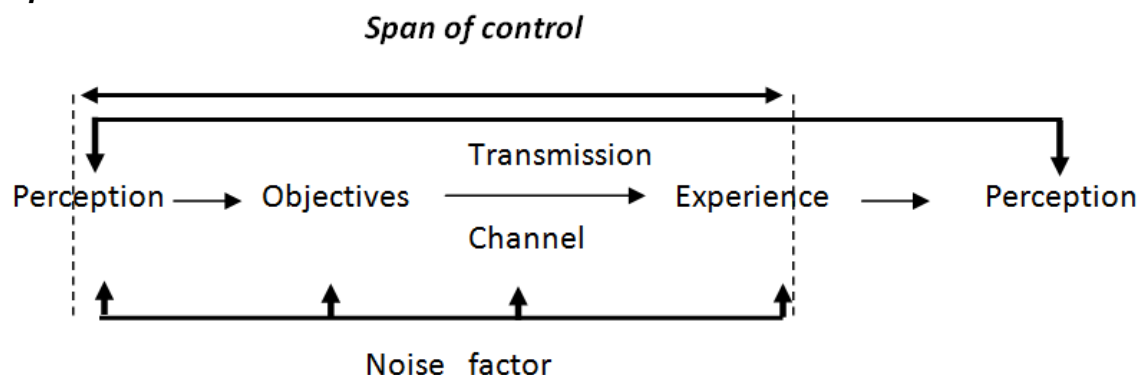
### ***Span of control***

The span of control component emphasizes the facilitating role of the teacher in her/his ability to control those processes involved in instruction. Bigge (1976) has observed that because a teacher is the manager of instruction, it is her/his job to plan, design, select and supervise the arrangement of these external events, with the aim of activating the necessary learning processes.

Curzon (1990:18) has also observed in terms of this facilitating role, that teaching is the system of activities intended to induce learning, comprising the deliberate control of those processes in which learning does occur. Teaching therefore, involves taking charge of the already identified set of events that affect learners in such a way that learning is facilitated.

Span of control is indication of the facilitating role of the teacher in managing the substance of instruction as advanced in the components of the systems approach as shown in the communication flow component and as expanded in the communication approach component. The role of the teacher as a facilitator is crucial to learning since it makes teaching learner-centred. The diagram expresses the process of control to confirm the role of the teacher as a facilitator.

### ***Span of control***



The span of control starts from teacher's perception. A good knowledge of subject matter is necessary for the appropriate perception in terms of the specific curriculum content to be taught. Similarly, a teacher has some control over the learners' perception in preparing them, through previous knowledge or entry behaviour for any new material to be taught. As already shown, span of control covers all components as activated by objectives including the choice of sensory channels as related to the kind of information involved. If it is important, for instance, for learners to distinguish texture, taste or smell, a teacher should provide them the means for doing so.

### **Field-test of TCC**

It was necessary to test the efficacy of this new communication theoretical framework with teachers. An Instructional Communication Programme (TCP), was therefore, developed and applied separately in Instructional Communication Workshops (TCWs)

whose key concept was effective communication, with relevant content covering primary/pre-primary, secondary and technical/higher education, in line with the division of instruction into these age groupings in the Nigerian system of education.

Reaction questionnaires were also separately applied to evaluate the core course units both individually and collectively including especially, the Instructional Communication course unit, which presented the Instructional Communication Concept (TCC) communication model. Evaluation was concerned to discover level of acceptance of the core course units in terms of; usefulness, relevance, effectiveness, quality and potential, using a 4-level scale. Since there were only two groupings of possible outcomes; acceptance or rejection, responses were analyzed on that basis, using frequency distribution and calculated in percentages. Mean scores were calculated across the groups based on the course units they had in common. Ten (10) evaluative statements were provided, which respondents were required to select truthfully as they applied to the TCWs.

### **Findings from field-test**

Findings showed a mean score of 83.0 percent in the evaluation of course units individually and also 83.0 percent in evaluating them collectively for primary/pre-primary education based on usefulness, relevance, effectiveness, quality and potential. For secondary education, mean scores were 75.4 and 76.3 percent respectively, while for technical/higher education, mean scores were 93.4 and 76.3 percent respectively. The Instructional Communication course unit had a mean score of 95.0 percent across all groups. The mean scores showed levels of acceptance.

The 95.0 percent score in the course unit which presented the communication theoretical framework, was indication of overwhelming acceptance and was therefore indicative of its efficacy for the training of teachers across the three age groupings of the Nigerian system of education. That all mean scores were above 75 percent in the core course unit evaluations was indicative of high acceptance of the core course units as applied separately across the three age groupings and confirmed the efficacy of the specialization approach to teacher education.

The evaluative statements also in mean scores across the three groups, which further confirmed the efficacy of both the theoretical framework and the specialization approach, showed that the TCWs were very informative (88.1%), were to be highly recommended (84.1%), were highly useful (81.1%) and were very motivating (72.3%). Additionally, the TCWs constituted an eye-opener (60.7%). These statements confirmed acceptance accorded the TCWs across the three groups, to the effect that the TCWs were very informative, were to be highly recommended for training teachers, had highly useful content and were very motivating.

These comments and the fact that contents of the TCWs constituted an eye-opener for over 60 percent of the respondents the majority of whom were trained teachers, confirmed the absence of these essential contents in the programmes with which the respondents had been trained. The implication for all teachers that had been trained in the same manner as the respondents is obvious.

## **Development of Professional Diploma in Education (PDE)**

The core course units based on the groups, formed the nucleus for developing the Professional Diploma in Education (PDE) programme. Starting with the groupings of the field-test, these core course units were then replicated to create eight areas of specialization, with a re-training component in view of the implication noted, to cover the Nigerian system of education. Areas of specialization include; early childhood, primary, secondary, technical, nursing, nomadic, adult and non-formal and university education.

The Professional Diploma in Education (PDE) programme was approved by both the Nigerian teaching regulatory body, Teachers Registration Council of Nigeria (TRCN) and by Senate of Ahmadu Bello University, Zaria in 2005 indicating its professional and academic acceptance. Teacher education institutions to implement PDE include; colleges of education, schools of education and similar units in polytechnics and institutes and faculties of education

### **New type of communication.**

The acceptance of the Instructional Communication Concept (TCC) communication model in the field-tests and especially its practical application in developing the PDE programme, has global applications as a type of communication. Bittner (1989) has shown the characteristics that distinguish mass communication, including; that it is limited to only the two sensory channels of sight and sound, is impersonal, is without interaction and with delayed feedback. In addition, noise is restricted to the transmission channel which again uses only these two sensory channels. These are characteristics which the new model removed, with suitable concepts injected, thereby creating a model that is different from mass communication models.

The Instructional Communication Concept (TCC) communication model, which has graphically explained instructional communication as a process, has shown it to be distinct from mass communication. This type of communication, which specifically applies to teacher education, has global applications in the fact that the teaching-learning activity in facilitating learning, is the same. As a distinct type of communication, types of communication therefore, now include; intrapersonal communication, interpersonal communication, mass communication and instructional communication.

### **Conclusion**

The development of instructional communication as a new type of communication, has confirmed the difference between communication in mass media and instruction. As already shown, communication theories exemplified by the models developed from the 1940s, were inappropriately used as the theoretical communication framework for instruction. A major consequence became the undue emphasis placed on technology or gadgets in instruction, which has had the effect of holding instruction captive to developments in technology.

The major beneficiary of the new communications technology in formal education, is the self or individual instruction mode offered in Open and Distance Learning (ODL), rather than regular classroom instruction. Indeed, self or individual instruction has gained prominence, as is also evident in the phenomenal growth of the open university system

and in individual use of mass media. The grip of technology in regular classroom instruction has been loosened by the systems approach to instruction where even more important resources required include, conducive physical environments and well-trained support personnel. However, with the new technologies, the mass media have acquired new prominence in providing instruction through e-learning.

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### About the Author

**Dr. Andrew A. Nkom** from Kaduna State Nigeria, earned his professional teacher qualification, the Nigeria Certificate in Education (NCE) certificate with Distinction in English in 1966. He holds a Bachelor of Arts (Second Upper Honours) degree in English in 1970 from Ahmadu Bello University, Zaria; a Master of Arts degree in Mass Communication in 1980 from Emerson College, Boston, U.S.A. majoring in Television Production and Public Relations and a Doctor of Education (Ed.D) degree in Educational Media and Technology with Special Interest in Educational Facilities in 1982, from Boston University, Boston USA.

Dr. Nkom started his university teaching career in 1970 at then Advanced Teachers College, Institute of Education, Ahmadu Bello University, Zaria, rose to the rank of Associate Professor of Education in 2001 and became the Director of the Institute, 2004 - 2006. He is currently at Nasarawa State University, Keffi.

His most outstanding contributions to teacher education specifically, have included the development of the Instructional Communication Concept (TCC) communication model, which provided the communication theoretical framework upon which he developed the Professional Diploma in Education (PDE) programme, which was accepted for national application in 2005.

Dr Nkom has extensive experience in Open and Distance Learning (ODL) having developed some of the courses in the Master of Education programme in Instructional Technology of the National Open University of Nigeria. Indeed, the book General Methods for the Professional Teacher: A Training Manual, which he published in 2008 as a reference book for the PDE programme, was written in the ODL mode.

e-Mail Andrew Nkom: [absnkom43@yahoo.com](mailto:absnkom43@yahoo.com)

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**Editor's Note:** This is an experiment to determine the effectiveness of a computer program to teach scientific concepts to classroom teachers.

## **The Effectiveness of using Educational Programming for Teaching the Students of Class Teachers some Scientific Concepts in Chemistry and Physics at University of Jordan**

**Adnan Salem AL-Doulat  
Jordan**

### **Abstract**

This study aimed at investigating the effectiveness in using the Educational Programming for teaching the students of Classroom Teachers some scientific concepts in Chemistry and Physics at University of Jordan. The study sample consisted of (57) female students who were distributed randomly into two groups; one is experimental and the other is control. The experimental group was taught on using the educational program while the control group was taught on using the normal method.

In order to achieve the study goals, a readymade relevant educational program was used. It included scientific concepts in the curricula of the classroom teacher specialization. Moreover, a test for cognitive achievement was developed. After collecting and analyzing data, the study showed some statistical differences in the experimental group in the cognitive achievement test.

**Keywords:** educational programming, scientific concepts, cognitive achievement, and students of classroom teachers.

### **Introduction**

The last decade of the twentieth century and the first few years of the twenty first century has witnessed a tremendous advancement in technology in general and in telecommunication and IT in particular. This advancement is still growing rapidly and producing many knowledge building mechanisms as well as more recent technological means. Thus, the world has developed very fast, whereas all the strategies and tools have increased in order to improve the students' participation in the educational activities within variant educational environments (Hutinger et al, 1996).

Whereas, the rapid development in telecommunication and IT and their applications has provided new opportunities and a new trend towards "information highway" as well as economic, social and educational effects related to it. Thus, rapid change can also lead to great changes in aspects of control, creativity, cooperation, participation and knowledge. It can also lead to wider participation and application on international, regional and national levels at international organizations and institutions (Mohammad and others, 2004).

In order to benefit from technological advancements in education, UNESCO held a conference in 1996 entitled "the new technological and educational policies". This discussed many topics such as learners' new roles and options to learn inside and outside the institutions in addition to the current applications of the new technologies and training during or before service in addition to the teachers' new roles.

It is noticed that technology has provided education with several recent methods, communication systems, information transference, video and visual systems, and multimedia systems which avail

great opportunity for teachers and students to achieve a tangible professional advancement in the educational field.

Within these huge and accelerating developments in technological matrix, it is worth identifying its role with the selected people to teach the elementary classes (first, second and third classes). Thus, to what extent can this accelerated technology respond to the needs of these people in the educational process?

Technology succeeded in opening the door for this category to those who would become producers for technology generations in the coming days. If you used these tools correctly and provided their services, then these individuals will be developed in presenting knowledge and their self-confidence will be enhanced (Skylar, 2006).

The computer is considered one of the most prominent current technological revolution achievements. This technology was invested in different ways; it was used in developing many of educational and scientific aspects as well as in facilitating many of their tasks especially in educational curricula and units. This harmonizes with changes was witnessed by the scientific community due to the era of technology and communication revolution which requires development in educational institutions' programs in order to keep up with these changes. Therefore, many has requested reconsidering the educational process content, goals, and methods to avail students in benefiting from the technical means and tools in scholastic achievement as well as to acquire knowledge, concepts, and tasks that correspond to this age in which we live (Roddy, 2004).

## Study problem

Education is affected by the astounding acceleration in communication and information technology, which requires reconsidering scientific concepts teaching methods at universities and schools.

Development in both the technological and educational fields led to the increase of interest in presenting the programs that suit students' capabilities through using supportive technology in their learning. This technology is represented by the computerized educational programs whereas scientific concepts especially the abstract science need tangible figures to help the students in representing the concepts. Therefore, they can form conceptual knowledge to help them understand these concepts, form cognitive structure for application, and benefit from them in solving daily problems. Accordingly, this study was an attempt to go along with recent trends in teaching sciences that make students' learning meaningful.

The study problem lies in the attempt of revealing the affects of using educational programs to teach some scientific concepts in Chemistry and Physics regarding cognitive achievement as well as teaching abstract concepts for classroom teacher students.

## Study question:

1. Is there any effectiveness in the methods of teaching by using computerized educational program on cognitive achievement of classroom teacher students?

Importance of the study:

The importance of this study is derived from the following:

- Using a program that facilitates the learning process as soon as possible for classroom teacher students. This process is represented by using supportive technological tools.

- Helping classroom teacher students in using the educational programs that depend on supportive technological tools and treating conceptual errors in less time and effort.

## Previous studies

There are many local, Arabic, and global studies in this field. The following is a presentation of some of these relevant studies.

The study of Unal, Okur & Kapucu (2010) titled "the effect of animation technique on the learning of properties of electromagnetic waves for pre-service science teachers". This study has been carried out with experimental and control groups consisted of 70 students in total. 34 students were randomly assigned to experimental group and control group respectively. Significant difference has been found between the experimental group and control group ( $p < 0.05$ ).

Furthermore, Bozkurta and Ilika (2010) performed a study entitled "The effect of computer simulations over students' beliefs on physics and physics success". The purpose of this study is to measure the impact of teaching that is carried out with interactive computer simulations on students' beliefs about physics and achievement of physics. The result was seen that the courses with interactive simulations have a positive effect on students' beliefs about physics and physics achievement.

The study of Al- Bashayrah & Al-Futainat (2009) titled "The Effect of Using a Computerized Educational Program in Performing Chemical Experiments on the Scholastic Achievement of Nine Graders in Chemistry and Geology". This study aimed at investigating a computerized educational program in performing chemical experiments compared to traditional program. The study sample consisted of 116 students; the results showed statistical differences in students' scholastic achievements due to the method of teaching ( $\alpha = 0.05$ ) (using computers in performing chemical experiments). It was in favor of the experimental group.

Al- Mutairy (2009) performed a study entitled "the Effectiveness of Using an Educational Program on 12th Graders in Mathematics". The study sample consisted of 60 students divided into two equal groups in terms of number, age, and scholastic achievement. The researcher realized that there are statistical differences between students' achievement (control and experimental groups) on the post achievement test. The result was in the favor of experimental group and this was due to the experimental treatment (teaching by using educational programming).

Furthermore, Al- Huzaify (2008) performed a study entitled "the Effect of Using E- Learning on the Level of Scholastic Achievement, Mental Abilities, and Tendency towards science of medium stage students". The researcher used the semi- experimental method and found statistical difference between the average of experimental and control students' marks regarding the post application of the achievement test. This means that using e-learning is far more effective in enhancing the achievement level than the traditional method.

The study of (2005) entitled "the Effect of Science, Technology, Society and Environment curve (STSE) on Eighth Graders' Science culture and trends towards learning them" aimed at investigating the effect of STSE curve on Eighth graders' scientific culture and trends towards learning science in Jordan. The researcher found out statistical differences at the significant level ( $\alpha = 0.05$ ) of marks means of applying scientific knowledge in making daily decisions as well as understanding science nature by eighth graders who learned according to STSE (experimental group) and students who learned according to the traditional method (control group). The results were in the favor of the experimental group.

## Method and Procedures

Research methodology: the researcher used the semi experimental methodology for being appropriate for this study.

### **Study sample**

The study was performed on students who are registered in scientific concepts and methods of teaching material at the University of Jordan for the second semester 2010/2011. They amounted to 57 female students whereas study sample randomly consisted of control and experimental groups; 27 female students in experimental group and 30 female students in control group.

### **Study tools**

First: the computerized educational program

- In order to achieve the goals of this study, a computerized educational program to teach some chemical and physical concepts and methods of teaching them in the course of scientific concepts for classroom teacher specialization and computerized educational program (Falcon, Version, 2012). It is a program designed to teach such concepts through a presentation of experiments using the Data Show and includes a number of questions at the end of each experiment regarding concepts to be taught. After that, the students can get the right concepts through new relevant experiments by the program.
- This program was presented to a number of arbitrators to ensure its appropriateness in teaching the investigated concepts. It was accredited without any modification according to the arbitrators' comments. This educational program sought to make the students acquire cognitive information and skills related to the use of laboratory tools relevant to the teaching of assigned scientific concepts. It also sought the identification of the new science and classroom teachers' roles during the program application. The computerized program was applied on the experimental group while the control group was taught using the traditional method for 4 weeks.

Second: cognitive achievement test

- A test was prepared to measure the achievement of classroom teacher students in the assigned educational material. For the sake of ensuring the test validity, it was presented to a group of arbitrators and experts in science teaching methods and curricula. After viewing their opinions, the necessary modifications were made. Afterwards, a surveying experiment of cognitive test was performed on a group of classroom teacher students to identify the test period as well as its statistical analysis in order to calculate difficulty, significance, and reliability coefficients.

### ***Psychometric characteristics of cognitive achievement test paragraphs***

In order to verify psychometric characteristics of the test paragraphs, it was applied on a surveying sample consisted of fourteen students and then difficulty and significance coefficients were calculated in the test's prototype which consisted of 50 paragraphs. Paragraphs in which difficulty coefficient amounted to 0.20-0.8 and significance coefficient to more than 0.20 were kept. 26 paragraphs achieved this criterion forming the final edition of the test used in this study; the significance coefficient means amounted to 0.41 while that of the difficulty coefficient amounted to 0.61. The table below shows difficulty and significance confidents of the test paragraphs.

### **Study terms**

Supportive technology: the tools or programs that work to enhance learners' performance (classroom teacher students).

Cognitive achievement: knowledge (facts, concepts, laws, principles, and theories) that are learnt by classroom teacher students from scientific concepts curricula and the methods of teaching them. It is measured by the mark of the learner gets in the achievement test prepared by the researcher.

Traditional method of teaching: several procedures done by the faculty member to explain scientific knowledge contents in the course of scientific concepts and methods of teaching them. He/she uses the assigned curriculum and the traditional tools.

Classroom teacher: each individual who studies this specialization and is registered in scientific concepts and methods of teaching them course.

**Table 1**  
**Difficulty and significance coefficients of the test paragraphs**

Paragraph no.	Significance coefficient	Difficulty coefficient	Paragraph no.	Significance coefficient	Difficulty coefficient
1	0.21	0.47	26	0.27	0.73
2	-0.44	0.27	27	0.36	0.83
3	0.11	0.87	28	0.63	0.83
4	0.24	0.60	29	0.58	0.70
5	0.56	0.63	30	0.43	0.93
6	0.21	0.87	31	0.15	0.013
7	-0.13	0.87	32	0.49	0.57
8	0.28	0.93	33	0.31	0.80
9	0.16	0.43	34	0.12	0.57
10	0.32	0.57	35	0.05	0.13
11	0.43	0.20	36	0.34	0.63
12	-0.14	0.63	37	0.43	0.47
13	0.34	0.80	38	0.57	0.67
14	0.31	0.87	39	0.42	0.67
15	0.26	0.73	40	0.53	0.67
16	-0.21	0.13	41	0.36	0.50
17	-0.21	0.10	42	0.19	0.17
18	0.29	0.43	43	0.43	0.60
19	0.36	0.73	44	0.61	0.63
20	0.27	0.63	45	0.46	0.57
21	0.12	0.23	46	0.57	0.57
22	0.38	0.93	47	0.55	0.67
23	0.31	0.90	48	0.54	0.67
24	0.09	0.30	49	0.02	0.20
25	-0.25	0.27	50	0.06	0.37

### **Study limitations**

The results of this study can be generalized in the light of the following limitations:

- The study was only about physical and chemical concepts assigned in scientific concepts and methods of teaching them course.
- The application of the study was only confined on students of “classroom teacher” specialization who are registered in scientific concepts and methods of teaching them course in the second semester 2010/2011.
- The sample was intentionally selected from “classroom teacher” program at the University of Jordan.

### **Reliability**

Reliability coefficients of internal consistency (Cronbach’s alpha) of the test and amounted to 0.83. It is considered high for this type of tests and acceptable for study purposes.

### **Study implementation procedures**

- Educational programming was selected for being available in the Dry Lap of the educational sciences faculty at the University of Jordan.
- The study was performed after the first half of the second semester 2010/2011. It took 4 weeks to teach the assigned scientific subject; 3 lectures a week and each lecture took 50 minutes. The experimental group was taught using the computerized educational programming while the control group was taught in the traditional method (explaining and using traditional tools) with the same numbers of lectures and by the same researcher.
- The computerized educational program was applied on experimental group students; they watched the assigned scientific concepts through the data show inside the dry lap. Students were discussing these concepts and relevant comparisons.
- After finishing the teaching process, a cognitive achievement test was applied on the students of both, experimental and control groups.
- After applying the study tools, data was collected and statistically analyzed in order to answer the study question and reach results.

### **Results**

Joint analysis results were extracted to examine the differences in students’ achievement between control and experimental groups. Table 2 shows that.

**Table 2**  
**Joint variation analysis for examining students’ achievements**  
**in control and experimental groups**

<b>Variation source</b>	<b>Total squares</b>	<b>Freedom degrees</b>	<b>Squares mean</b>	<b>F value</b>	<b>Significance level</b>
<b>Pre</b>	274,9	1	274,9	24,50	0,00
<b>Group</b>	64,2	1	64,2	5,72	0,02
<b>Error</b>	606,2	54	11,2		
<b>Total</b>	926,1	56			

Results in Table 2 showed a statistical difference at less than 0.05 in the achievement degrees between control and experimental groups; F value amounted to 5.72. Post means in Table 3 showed that this difference was in the favor of experimental group students; their post mean amounted to 19.47 while control group students' amounted to 17.33. This means that the experimental group's members have improved by (2.13).

**Table 3**  
**Post means for students' marks according to the group**

Group	Mean	Standard error
Control	17.33	0.63
Experimental	19.47	0.61

## Results Discussion

Results that are related to the study question showed through Table 2 statistical differences at the significance level of 0.05 between pre and post measures of experimental group members. This difference is attributed to the educational program and in the favor of the post test.

The researcher attributed this development to the computerized program which was applied on the sample. It helped enhancing the achievement of the experimental group students. This corresponds to the study (Al- Bashayre and Al- Futainat 2009; Al- Mutaury 2009; and Anel, Awker, and cabico 2010) about a relationship between using computerized educational system and the enhancement in students' achievements. Table 3 shows the difference between post means of both groups in the favor of the experimental group; the post mean of experimental group amounted to 19.47 while it amounted to 17.33 for the control group.

This result reinforces the researcher's explanation for these differences; the computerized program increased students' interaction with the program through computerized comparisons and scientific experiments shown in the class. This facilitated the understanding of scientific concepts and therefore it affected the cognitive achievement of experimental group students.

## Recommendations

The study recommended:

1. Using computers in teaching scientific concepts for classroom teacher students in all science courses in order to deepen their understanding through relevant comparisons and experiments.
2. Increasing the classroom teacher-students understanding for scientific concepts through increasing their practices for the directive relation between understanding and cognitive achievement.

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### About the Author

**Dr. Adnan Salem Al-Doulat** is an Assistant Professor in Curriculum and Instruction, Faculty of Educational Sciences, University of Jordan in Amman.

Email: [adnan\\_doulat@yahoo.com](mailto:adnan_doulat@yahoo.com)

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**Editor's Note:** Blending learning combines relevant aspects of face-to-face instruction and e-Learning to achieve educational objectives. It is accepted favorably by teachers and students as a way to improve teaching and learning.

## **Faculty-Staff Attitudes towards using Blended Learning in Architectural Design Courses in Bahrain**

**Saad Fawzi Al-Nuaimi and Elsayed Abd-elMawla Aboukhatwa**  
Egypt

### **Abstract**

Architectural Design is a core course in the study plan for the architecture degree. The aim of this study is to determine faculty attitudes towards using blended learning in architectural design courses including the use of drawings and presentation programs. An instrument (scale) was designed to evaluate faculty attitudes and 34 concepts. This scale was implemented to a sample of 21 faculty members in architecture departments that teach architectural design in different universities in Bahrain. The results show positive attitudes for faculty toward using blended learning in teaching architectural design courses. The mean rate was 77.5% and the results show that 80.9% of the sample use Auto CAD and Photo Shop. Results confirm no significant difference in the scale between the male and female faculty members.

**Keywords:** attitudes, blended learning, architectural, design courses

### **Introduction**

Teaching architectural design nowadays depends on technology such as computer programs to design a project easily and quickly. e-Learning can solve some of the course problems, but some aspects of the subject require physical contact between students and the instructor for project design and criticism; Therefore, blended learning is one of the learning ways for this course.

Blended learning appears to offer a great deal when used to enhance teacher education programmes. It can bring together students from all locations and a range of backgrounds and can provide a media-rich, collaborative, personalized and interactive learning environment. Its affordances remain possibilities until given substance within the confines of a particular programme (Simpson & Anderson, 2009)

### **Study Objectives**

The following objectives were developed in order to accomplish this study:

1. To determine which technology used by the faculty staff.
  - Electronic mail, Chat rooms
  - Searching the Internet
  - Architectural programs (Auto cad, 3Ds max ...etc)
  - Materials design, Web page design
  - Typing and maintaining lesson plans
  - Office work: student records
  - Assigning and checking reports (e.g., word, excel)
  - Homework via e-mail

2. To determine the using of any drawing programs and Architectural used programs (such us: Auto cad, 3Ds max ...etc)
3. To determine the teachers attitudes toward the used Blended Learning in Architectural design courses.
4. To determine the relationship between Male and Female attitude toward used Blended Learning in Architectural design courses.
5. To determine faculty staff need for blended learning concept.

## Framework

Blended learning means using more than one tool to reach learning goals, which blend traditional learning and the tools of e-learning.

The term blended learning is used to describe a solution that combines several different delivery methods, such as collaboration software, Web-based courses, EPSS, and knowledge management practices (Valiathan, 2002)

Blended learning is the most logical and natural evolution of our learning agenda. It suggests an elegant solution to the challenges of tailoring learning and development to the needs of individuals. It represents an opportunity to integrate the innovative and technological advances offered by online learning with the interaction and participation offered in the best of traditional learning. It can be supported and enhanced by using the wisdom and one-to-one contact of personal coaches.(Thorne, 2003, p.2)

Some studies define blended learning programs as mixes of various event-based activities, including face-to-face classrooms, live e-learning, and self-paced learning. This often is a mix of traditional instructor-led training; synchronous online conferencing or training, asynchronous self-paced study, and structured on-the-job training from an experienced worker or mentor (Thorne, 2003).

## Blended Learning Models

There are three models of the blended learning (Valiathan, 2002):

- Skill-driven learning, which combines self-paced learning with instructor or facilitator support to develop specific knowledge and skills
- Attitude-driven learning, which mixes various events and delivery media to develop specific behaviors
- Competency- driven learning, which blends performance support tools with knowledge management resources and mentoring to develop workplace competencies.

Among the previous models the current study is interested in the second model, which explain the technology used in the Table 1.

**Table 1**  
***Attitude-Driven Blended Learning Plan***

	<b>Technology-based techniques</b>	<b>Non-technology based techniques</b>
<b>Announcement</b>	LMS or email push	flyer, email, or phone
<b>Overview session</b>	email , Webinar	traditional classroom and studios
<b>Self-paced learning</b>	Web-based tutorial ,e-books simulations	articles, magazines, books, workbooks with decision tables
<b>Query resolution</b>	email ,instant messenger	face-to-face meeting with expert
<b>Assessment</b>	simulations	print test
<b>Collaborative session</b>	Webinar ,chat	role-playing with peers
<b>Practice</b>	simulations	role-playing with peers
<b>Feedback and closing session</b>	Email, Webinar	traditional classroom

The architectural design courses are the most important practical courses in the department of architecture and architectural engineering, and if we can use this type of learning in these courses, that means we solve the most important node in the using of this type of learning in such courses and departments.

### ***Types of blended learning levels***

There are many types of blended learning levels which start from the simplest level to the best one; these levels can be shown as (Singh, ,2003):

1. Blending Offline and online Learning:
2. Blending Self-Paced and Live, Collaborative Learning:
3. Blending Structured and Unstructured Learning:
4. Blending Custom Content with Off-the-Shelf Content
5. Blending Learning, Practice, and Performance Support

Using of the blended learning is not depend one of the previous levels; it can mix between more than one level; that will be depended on the course objectives, students' needs, scientific approach and the learning environments.

## Dimensions of Blended Learning Environments

There are seven dimensions of blended learning environments found across the six cases: the teacher, online, face-to-face and self-study dimensions, the resource-based learning dimension, the institutional support dimension and the organizational context dimension. (Oliver, 2002, p.246)

Latchem and Jung (2010) explain the benefits that can be reached by blended learning according to the learning purpose, as shown in Table 2.

**Table 2**  
***Purposes and benefits of various blended learning approaches:***

<b>Purposes</b>	<b>Benefits</b>
Providing multimedia content and learning resources	Students use the computer software wherever and whatever. They can submit further requirements, information and links Students develop their skills and understandings in uses of ICT
Providing asynchronous or Synchronous online interaction	Tutors and students alike can debate issues and share ideas, drawing on their own experience, viewpoints and readings Students with each other and their tutors
Providing opportunities for face-to-face teaching and interaction	Students can develop understandings, gain confidence and form bonds with their classmates and tutors Students can better identify with the providing institution or organization Students can engage in 'real-world' learning activities
Providing tutoring and mentoring	Support can be one-on one or group-focused Students feel encouraged and supported in their learning Students are shown that their teachers are interested in them and ready to help them in their learning
Assessing student progress and learning outcomes	Combining these different modalities achieves efficiency and effectiveness in delivering and receiving student assignments and tracking and assessing patterns in students' learning, performance and attitudes Students receive timely Feedback `124-125

**Khine and Lourdusamy ( 2003).** On the whole the attempt to combine face-to-face instruction, multimedia viewing and online discussion to deliver a module in the teacher education programme received positive feedback from the trainee teachers. It was found that this approach is beneficial when:

- Face-to-face tutorials are activity-based.
- Materials given in the CD-ROM are authentic and contextually relevant; and
- Marks are allocated to encourage optimum online participation.

## Previous Studies

According to the previous studies which approved the effective of the blended learning to achieve the different learning outputs:

1. Charlier's & Platteaux, (2005) reach to many results; first result. All the students adopt a deep learning approach. They focus on understanding and on relations with their own practices and projects. The second main result is that the students developed their teaching competencies. This research shows the effectiveness of certain choices that are characteristic of the hybrid environments for the training of the teachers. It allows the establishment of precise relations between a whole of conditions of formation, the individual characteristics of the teachers and some effects on the learning.
2. The study of Yushau (2006) examines the influence of blended e-learning on students' attitude towards mathematics and computers. The result indicates that the subjects have positive attitude towards mathematics and computer (Yushau, 2006).
3. Adriadurai & Manohanthan (2008) recommendations are given to improve the overall effectiveness of the engineering courses. It is anticipated the adoption of these recommendations will result in greater student competency and lower drop-out rates.

## Architecture and Learning

In architecture, as in other applied disciplines (engineering, medicine, chemistry, experimental physics, etc.) the learning process mainly focuses on continues interaction between theoretical knowledge, notions that are acquired through example, through advice of the most capable ones and, above all, practice in the discipline itself. In consequence we have lower possibilities of a collective use and difficult sedimentation of the experience acquired through the design process (Spigai., 2004).

Learning as an interactive process is an important issue in architectural design education; so some studies found that there were statistically significant differences between the performance scores of students having diverse learning styles at various stages of design process. Also, it was found that performance scores of all students having different learning styles had increased at the end of the design process where the progress of assimilating learners were the highest and accommodating learners the lowest (Demirbaş and Demirkan,2003)

## Architectural Design Studio

Many studies described design studios as places where real cities, buildings etc., are designed, improved and transformed. The architectural design studio should function both as a learning centre and a complex social organization like other learning environments.

Design studio process is quite important in design education and all the courses taught in design education are related to the design studio. It is concerned with the definition of design education, its' problems, relations and contents at sociological level and its relation to other disciplines at epistemological level (Demirbaş and Demirkan,2003).

The concept of integrating the teaching of design computing into the design studio is not new, this research studying the mixing of teaching ways; it's between computing and traditional (face to face) design studios.

Teaching methods must also be taken into consideration. An increasing emphasis has been placed on design-oriented teaching approaches in the last twenty years. By this we mean teaching methods aiming the application area in which computers are to be used, rather than the systems. The results are mostly courses within programmes adopting design-oriented teaching methods.

However, the growing interest in using of computer skills in the learning approach has rarely affected CAAD teaching programs as a whole. Some studies describe a post-graduate programme that has been structured under a design-oriented approach through a set of courses in which the

emphasis falls on the application in the architectural design process rather than on the software paradigms or categories (Silva, 2000).

### ***Learning the principles of architectural design process***

There are all kinds of definitions on offer in architecture field, from the formal French model of Jean- Nicolas Durand to the interdisciplinary model of the Bauhaus by Gropius, and Tschumi's 'paperless studio' at Columbia.

According to the National Architectural Accrediting Board (NAAB) of the US, architectural education is at its best when it demonstrates 'a positive and respectful learning environment, structured around the values of optimism, respect, sharing, engagement, and innovation'.

At The University of Newcastle the School of Architecture and Built Environment strongly believe in the potential of the studio model. They regard design as the central activity of architectural education, and the students' experience of the design studio is essential. The studio is a 24/7 educational community, an 'intellectual hot house', with an atmosphere of dialogue, mutual critique, events, inspiration, self-directed peer learning, creative energy, coffee drinking, and much more (Lehmann, 2007).

## **Design Studio Teaching Practices**

### ***Between traditional, revolutionary, and virtual models***

Literature on architectural education corroborates that there are some fundamental disagreements over what is meant by architecture and design. This in essence conveys that teaching architectural design means different things to different people; each educator teaches according to his/her own set of ideologies and beliefs and in a manner that is distinct from others. Concomitantly, there is a tremendous diversity of contents, areas of emphasis, and methods of teaching in different schools and even within one school.

The virtual design studio represents the recent advances in CAD and visualization, combined with technologies to communicate images, data, and simulated live actions. Interestingly, none of the models has replaced another; the three models coexist now in most schools of architecture around the world either as distinct unique models or integrated to form new models (Salama, 2006).

### ***The computer and architecture design studio***

The computer-supported communication and collaboration among partners in the building design and construction process are no longer mere possibilities, but, given the know-how of the participants, a reality.

There is a research documents an experimental approach to design collaboration, tested in an intensive, one week long Virtual Design Studio (VDS) exercise, World Wide Web, and video-conferencing (Branko, 1999).

Some studies analyze the pedagogical use of high-end computer graphics and low-and high-bandwidth Internet technology for international architectural education among numerous universities in the Americas. The research applied to any discipline that involves a large number of participants within a design setting. The experiments have allowed design studios from seven schools of architecture in the U.S. and South America to work in a semester long design studio. Most of the collaboration was accomplished by using low bandwidth Internet communication such as web publishing, chat, computer assisted design software and other technologies such as ISDN broadcasting (Andia, 2002).

### ***Procedures for the preparation of a trend towards using blended learning in the teaching of architectural design decisions:***

Target scale identification of trends for faculty use blended learning in the teaching of architectural design, and the researchers had access to the literature on integrated learning and measurement trends, this scale has been prepared using "Likert, identified a number of alternatives as Quintet, before every phrase group responses : strongly agree, agree undecided, disagree, disagree strongly, and the faculty member must respond to every phrase of words mark indicating a preference for an alternative, to reach the final image of the scale was done the following.

### ***Review some educational literature on measuring trends.***

The number of benchmarks trends towards themes related to e-learning technology, with a view to identifying major themes underlying those metrics.

- Having taken formulating expressions scale simplicity and clarity in construction terms and do not use vague words, unusual or scientific terminology for non-specialists, and the phrase can be interpreted in more ways, excluding the phrase that everyone is expected to approve or reject them, and use the phrase denied exile.
- The primary scale contains (37) term, distributed on three axes head are:
  - Axis I: enjoy using the blended learning.
  - Axis II: the sense of the importance of using blended learning.
  - Axis III: ensure use blended learning.
- To check the veracity of content scale, the primary scale was viewed by the number of arbitrators on technology education and the teaching of architectural design decisions to ensure clarity of language standard, and how each is to link from, and add or delete what they consider appropriate and necessary.
- Arbitrators have shown a series of observations as delete some repeated and unclear words, taking into account the observations of others recommended by arbitrators in areas that they sincerely, became standard.
- A hierarchy of five degrees in this scale assessed, positive words for the response (agree strongly, agree, undecided, disagree, disagree strongly) ratings (5, 4, 3, 2, 1) respectively, for negative phrases were given to the same previous responses (1, 2, 3, 4, 5) Respectively, according to the degree estimation system calculates the average of each measure's words, as a whole, if the average is greater than (3) the trend is positive, while averaging less than (3) the negative trend.

### ***Calculation of reliability scale***

By applying equivalent (Coronbach's Alpha (@)) using statistical software package (SPSS) the reliability coefficient for scale reached (0.81), this indicator of the scale is an acceptable degree of consistency.

Preparation of the final image to scale: in the light of the above steps, the scale is applicable, where included (34) terms for a standard distribution of faculty members, and sent via email to another group, and were retrieving (21) which analyzed as follows:

## Results

### *Characteristics of the study sample*

Table 3 demonstrates the characteristics of the sample:

**Table 3**  
***Characteristics of the participants***

Characteristics	F	P
<i>Gender</i>		
Male	11	47.6%
Female	10	52.4%
<i>Ages:</i>		
20-25	1	4.5%
26-30	2	9.5%
31-35	4	19%
36-40	5	23.8%
41-45	4	19%
45and above	5	23.8%
<i>Years of teaching experience:</i>		
Less than 1 yea	1	4.5%
1-5	2	9.5%
6-10	7	33.3%
11-15	5	23.8%
16-20	3	14.3%
21 or more	3	14.3%
<i>Currently teaching at:</i>		
Under graduate level	14	66.7 %
Post graduate level	0	0%
Under and Post graduate	7	33.3%
<i>Times of computer use:</i>		
less than once a week	0	0 %
1-2 times a week	0	0 %
3-4 times a week	0	0 %
5 or more times a week	21	100 %
<i>using any drawing programs:</i>		
yes	17	80.9 %
No	4	19.1%
Auto CAD	17	80.9 %
Archi-CAD	7	33.3%
3Ds MAX	15	71.4 %
Photo Shop	17	80.9 %
Revit	8	38%
<i>completed any training courses:</i>		
yes	8	38%
No	13	61.9%
a- E-learning:	6	28.6%
b- Blended learning	2	9.5%

The table indicates that all respondents teach undergraduate students and graduate students, and use the computer more than five times a week, and 80.9% of them use drawing program Such as:

Auto CAD, Photo Shop, and some have suggested using other software like. .. a 3d rendering, paint and Rhino 3D.

Table 4 shows; at any stage allows your students to use the computer programs in architectural design course?

**Table 4**  
***the using of computer programs in architectural design courses***

First stage		Second stage		Third stage		Fourth stage		Fifth stage		Post graduate	
F	P	F	P	F	P	F	P	F	P	F	P
9	42.9%	15	71.4%	12	57.4%	8	38%	5	23.8%	7	33.3%

## Section Two

### ***General Attitudes***

This section is to find out about your general attitudes towards Blended learning in general, and towards using computer technology in language instruction. As shown in Table 5 A and B.

**Table 5**  
***the purpose do you use computers***

items		rarely		Some times		often	
		F	P	F	P	F	P
1.	Electronic mail	2	9.5%	1	4.5	18	86%
2.	Chat rooms	8	38%	9	42.9%	4	19%
3.	surfing the Internet	2	9.5%	8	38%	11	52.4%
4.	Architectural programs (Auto cad, 3Ds max ...etc)	2	9.5%	6	28.6%	13	61.9%
5.	Materials design	6	28.6%	11	52.4%	4	19%
6.	Web page design	10	47.6%	8	38%	3	14.3%
7.	Typing and maintaining lesson plans	4	19%	7	33.3%	10	47.6%
8.	Office work: student records	3	14.3%	6	28.6%	12	57.4%
9.	Assigning and checking reports (e.g., word, excel)	3	14.3%	5	23.8%	13	61.9%
10.	Homework via e-mail	5	23.8%	9	42.9%	7	33.3%

According to the previous table; many of the instructors are using the followings: Electronic mail, Architectural programs, Assigning and checking reports (e.g., word, excel), Office work: student records, that's refer to the importance of these uses in the architectural design studios

**Table 6**  
***Faculty staff attitudes towards using of Blended Learning in Architectural design courses***

#	Items	Mean	Relative weights
1.	I like using e-learning technology in teaching architectural design	<b>3.80</b>	<b>75.0%</b>
2.	Using e-learning technology makes me more efficient in my life	<b>3.43</b>	<b>68.6%</b>
3.	Using e-learning technology with traditional learning makes me more efficient at my work	<b>3.95</b>	<b>79.0%</b>
4.	Using computers and internet generally makes completing tasks easier.	<b>4.43</b>	<b>88.5%</b>
5.	I like using computers and internet for teaching purposes in my classes.	<b>4.30</b>	<b>85.7%</b>
6.	I like searching the internet for teaching resources.	<b>4.10</b>	<b>81.9%</b>
7.	The use of the computer in architectural design will limited me on follow-up student.	<b>4.14</b>	<b>82.9%</b>
8.	I think that my use to architectural design software will grow up the creative design of students.	<b>4.33</b>	<b>86.6%</b>
9.	I Use the software of architectural design in the studio in front of students.	<b>4.20</b>	<b>83.8%</b>
10.	I encourage my students to use computers in completing the architectural projects	<b>4.30</b>	<b>85.7%</b>
11.	I feel that if my students are using the programs of architectural drawing; them architectural creativity will not be developed.	<b>4.47</b>	<b>89.5%</b>
12.	If I have time, I would like to try out instructional computer technology innovations in my teaching.	<b>3.86</b>	<b>77.0%</b>
13.	I believe I can take risks in teaching with computer technology	<b>2.71</b>	<b>54.5%</b>
14.	Computers can be a good supplement to support teaching and learning	<b>4.60</b>	<b>91.4%</b>
15.	I think that blended learning not develop the basic skills of architectural design students.	<b>4.15</b>	<b>81.0%</b>
16.	I think if my students use the blended learning provides them the time and effort.	<b>4.20</b>	<b>81.9%</b>
17.	I want constantly develop my skills in blended learning.	<b>4.15</b>	<b>81/0%</b>
18.	I am not benefit from the use of software architectural design in teaching.	<b>4.70</b>	<b>93.3%</b>

#	Items	Mean	Relative weights
19.	I think that the blended learning does not provide built-communication between teacher and student.	4.3	85.7%
20.	I feel satisfied when integration e- learning in my lecture.	4.15	80.9%
21.	I think that my students were more satisfied when we use technology in education.	4.3	85.7%
22.	Blended learning helps me to interact with my students in different ways.	4.3	85.7%
23.	Difficult to join the training programs in blended learning for lack of time.	2.71	54.3%
24.	Blended learning can employ in the subject of architectural design to achieve the educational goals.	3.81	76.2%
25.	I think that blended learning is suitable for teaching architectural design of the e-learning only or traditional learning only.	3.52	70.5 %
26.	I do not have the incentives to participate in the workshops in the hiring of blended learning in teaching.	3.3	65.7%
27.	Blended learning does not help students in their projects preliminary design submission.	4.33	86.7%
28.	I think that blended learning will help students in the evaluation of more than one method.	4.2	84.0%
29.	I think the blended learning will make the Day sketch easier for my students and me.	3.81	76.2%
30.	I think that there is no difference between using and neglecting blended learning and in teaching and learning.	3.43	68.6%
31.	I think that my use to blended learning will weakens the relationship between my students and me.	4.24	84.8%
32.	I have difficulty in teaching architectural design by using the blended learning method.	3.76	75.0%
33.	I feel that the blended learning is not efficient method in teaching architectural design.	4.15	81.0%
34.	I feel that the blended learning reduces students' educational coasts	4.2	83.8 %
35.	total	3.8	77.5%

The table shows that trends in faculty use blended learning in the teaching of architectural design positively, bringing the overall average 3.8 is than average neutral (3) and this underscores the importance of using blended learning in the teaching of architectural design, and then there is

great importance to preparing faculty and from using blended learning in teaching decisions for architectural design because there is a great interest to the instructors and students.

In terms of the differences between men and women; the following table shows the trend, indicative of the differences between men and women

**Table 7**  
**Statistically function differences between men and women**

VAR	N	Mean Rank	Sum of Ranks	Mann-Whitney U	p-val
Male	11	9.36	103.00	37.000	0.205
Female	10	12.80	128.00		

The table shows no statistically function differences between men and women but positive attitudes towards the blended learning in teaching architectural design.

## Conclusion

The results of the study show that the trends of faculty to use the blended learning in teaching architectural design is positive, and this confirms the importance of blended learning for both instructors and students, so they must be trained faculty members to use the blended learning strategies in teaching architectural design, and to use various software that can be useful in this area. Because the blended learning:

- Combines e-learning advantages and the benefits of traditional education.
- Enhances traditional teaching methods used by faculty members of various technological means.
- Promotes ease of communication between instructors and students, and between students and each other, through continuous interactive environments that provide students with clear examples through various applications, and enable them to express their ideas and participate actively in class discussions.

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## About the Authors

**Dr. Saad Fawzi Al-Nuaimi** is from the Faculty of Engineering, Gulf University and Assistant Professor, Alexandria University, Arab Republic of Egypt.  
[dr.saad@gulfuniversity.net](mailto:dr.saad@gulfuniversity.net)

**Dr. Elsayed Abd-el Mawla Aboukhatwa** is Director of eLearning Center, Faculty of Education, Alexandria University and Gulf University, Arab Republic of Egypt.  
[drsayedtech@yahoo.com](mailto:drsayedtech@yahoo.com)

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**Editor's Note:** For many adult learners, distance education is the only option that fits with the demands of the workplace, home and family. This study determines how to build a *community of practice* to optimize learning environments to make online teaching and learning more effective. It also recognizes potential problems and ways to overcome them.

## Narrowing the I-95 Corridor: Utilizing Distance Learning Technology to Bring Classrooms Together

Scott P. Barnicle, Mary T. Orr, Anne L. Kern  
USA

### Abstract

It began with a question: *how could an effective class presentation—one that facilitates group discussions and actively engages students — be given when students can only see each other on an LCD screen?* It ended with a round of applause, praise from our professors, and the desire to share our story of success. In recent years the University of Idaho has struggled, as have many other universities around the country, to effectively manage distance education (Klopfer, Osterweil, & Haas, 2009). A small group of doctoral students in the education program at this university endeavored to build a community of practice (Wegner, 1998) using a hybrid delivery platform. By anticipating potential problems, they were able to overcome the barren environment of on-line learning to meet the instructors' challenge of bridging the distance between the two campuses, facilitating group discussions, and collecting data, while fulfilling the course objective to understand and use qualitative research. This case study can help students and faculty transition to newer classroom modalities, utilizing technology to improve distance learning education.

**Keywords:** distance, learning, technology, smart-classrooms, media, online-classes, graduate, student, modern, blackboard.

### Use of Technology in Universities

Like many institutions of higher learning around the country, in order to be competitive (Roussey, 2012) the University of Idaho has explored numerous ways to extend its classrooms beyond the walls of the main campus, and in that, has succeeded. The university has created two high-quality interactive technology sites around the state, and a third is being considered. This commitment was in response to a need to connect the university's satellite and extension centers, and more importantly as an effort to meet the needs of its non-traditional students entering the college experience (Henrich & Kenyon, 2011).

The university has invested a large portion of its classroom enhancement funds and manpower in "smart" classrooms and teleconferencing capabilities (Weiner, 2000), including software such as Blackboard and WebCT. While this investment capital and some impromptu training have been available to instructors, it has not been enough to ensure student success when engaging in these new technologies. The deficiency of instruction towards achieving effective pedagogical strategies has been an issue at the university. The lack of identifiable student successes and guidelines for instruction has frustrated both investors and academics (Zhao & Bryant, 2006) around the country, and a viable solution has yet to be found. This in turn has increased the pressure and anxiety for implementing this type of novel learning environment to its full potential (MacPherson, 2000).

This is not to say instructors and students are not technologically savvy: many facets of technology are requirements for a twenty-first century collegiate education (Goldin & Katz, 2009). However, it is the lack of acculturation to the modern classroom that has frustrated those

involved (Carlson, 2002). Our group may not have solved this issue; we simply think we took a big step in the right direction.

The two professors who co-taught this research class at different sites utilized the hybrid model of teaching to extend the reach of the course. In recent years, the hybrid model of teaching has been implemented with a wide range of technological tools such as web-cameras, recorded lectures posted online, and interactive white-boards to connect non-traditional and distance students to the location of the instructor (Skill & Young, 2002). Research has shown certain populations respond better to this model, for example younger female students in accounting courses (Dowling, Godfrey, & Gyles, 2003), yet these results have not been shown consistent across all populations and fields. The Hybrid model is consistently evolving (Tuckman, 2002) to meet the needs of the particular population (Reasons, Valadares, & Slavkin, 2005), and aside from mixed reviews from students, continues to be a powerful tool in the evolution and transformation of the modern classroom (Koohang & Durante, 2003).

### ***Utilization of The Hybrid Model***

In order to understand and use the hybrid model more appropriately, the instructors put the teaching into the hands of the doctoral students. The students taking the course were all experienced educators familiar with various modes of inquiry instruction, which can be through of as involving students in a form of active learning that emphasizes questioning, data analysis, and critical thinking (Bell, Smetana, & Binns, 2005). Students were instructed to form individual groups, preferably at either end of the camera, and to implement qualitative research methodology. Our group, comprised of primarily sport and exercise psychology doctoral students, decided to focus on effective pedagogical strategies through the implementation of a case study as a qualitative research paradigm. This research paradigm had the explicit goal of effectively implementing and utilizing the recently installed high-end technology at the university. A second but equally important goal was to provide an engaging, fun, and compelling learning experience for our peers.

One major advantage our group had in preparing for this project was that we were familiar with many of the products used to engage the technology-born generation. Some group members could not remember a time without the Internet, let alone cell phones, text messaging, video chat, and teleconferencing: these are common in our everyday lingo and technology use. Thus the idea of using the University's new technology to engage our peers in an effective and interactive learning experience was second nature. Even though most of us were comfortable with a high-tech learning environment, none of us knew exactly how to build this community of learners between the sites in an authentic manner similar to the student engagement seen in the face-to-face classroom. We however, prepared and eager to use the classroom technology available to support our vision of constructivist learning (Jonassen, Peck, & Wilson, 1999).

## **A Case Study Example**

### ***Learning While Doing***

During the development and planning of our project, it was clear that in order for the presentation to be effective in reaching our learning objective and deem successful, each group member had to have a clearly defined role in order to keep continuity and clarity when engaged in the "teaching" presentation. As our group was the first to present, we had minimal time to plan; roughly three weeks. Due to the nature of the assignment, we were grouped with members participating at each course site, over ninety miles away. We knew we needed to manage our time, define our scope of presentation, and attempt to close the distance between our colleagues through implementation of technology. As our timetable was short, we knew that much our presentation was going to emerge while we taught our lesson. Since our prior knowledge and use of technology was strong, none of

us felt troubled by the emergent nature of the teaching presentation activities. However, our confidence came to a screeching halt days before we were scheduled to present. There was rumbling among the group members of being completely unprepared, with concerns about talking over each other, delays in audio and video communication, fear that our class peers would lose interest, and we would run out of time to complete our lesson and activities. It was not until the day before we were to present, that we actually felt we comfortable with how we would enact our presentation and felt a sense of comfort to what we were about to do the following day. This sense of emerging confidence through deliberate collaboration among our team ensured that we actually felt a sense of success...or at least a confidence that would carry us through the event.

### **Phase One**

Once the project set in motion, phase one of our teaching presentation consisted of three group members—two in Moscow and one in Coeur d’Alene, Idaho—leading small group discussions with roughly five classmates per group. The fourth group member was designated as the "roamer" who virtually roamed between the two discussion groups through the technology. I, the first author of this article was the roamer. My responsibility was to encourage my fellow classmates in discussion by lowering the defensive walls among them by asking specific probing question. I virtually mingle between the two distant classrooms using the LCD screen and audio transmission between the two classroom sites. With an eye on each classroom, I was able to interject anecdotes whenever there was a need to ease the discussion groups’ frustrations or hesitation to engage in our activity.

My other group members facilitated the individual classroom group discussions on the selected topic, while collecting data to through field-notes for use as work product for our lesson objectives. We were also assisted by the "silent" classroom members at each site; the computer technologists. These individuals were vital in helping assist us in maintaining the community of learning by immediately responding to any technological "glitch" that occurred during the lesson activities. During these “glitches” I noticed that my classroom peers to engage with their peers across video and with technology. It could have also been a combination of being forced to engage with the technology, and even the presence of our instructors that cause our classroom peers appeared hesitant at first to share their true feelings and experiences about our lesson. However, through humor and patience, our group was able to overcome the resident voices and stirred discussions, lightened the mood, and mitigated any fear and frustration during the "glitches". Ultimately, we were able increase in participation among the class across site and increase the enthusiasm around the room for the lesson activities and move forward to meet the objectives for our lesson.

### **Phase Two**

In phase two of our lesson, we had the groups come together as one class to share and facilitated an analysis of the data we collected on the topic of our group lesson: the pros and cons of distance education. As a whole group, with our instructors placed back in their traditional roles, we saw our classmate discussed their personal experiences of online/hybrid learning at the university. Themes emerged that were discussed, such as the pros and cons of the financial, logistical, and educational ramifications and supports from the institution. While this debate was heated, informational, and at times entertaining, it was the use of the classroom technology, the group's quiet partner, which allowed the debate to occur at and among the two sites Moscow and Coeur d’Alene. The class was able to use the full range of technology that was made available microphones, monitors, webcams, large LCD screens and even the presentation podium. It was as if we were all in the same single classroom.

Unbeknownst to us, our professors shared our findings to the college administration. The administration was engaged in restructuring the college’s program delivery of courses, and they

were thrilled by the student led evaluation process of the project. Furthermore, we were encouraged to dig a bit deeper into the topics that we had focused; use of technology in the classroom, distance learning group presentations, and group cohesion during presenting. Thus encouraged, we reconvened our classmate groups at the end of the semester, and revisited the original question on technology. In the end, the group discussions elicited data that was informative and provocative. By effectively using the technology provided and structuring our group lesson and ensuring classmate discussions with a roamer, we were able to effectively teach a qualitative paradigm, collect useful data to engage our classmate in an authentic qualitative research activity, which ultimately, has resulted in this little manuscript. Our group envisioned that we need to create a community of learning in at-distance learning environment via teleconferencing and computer-based presentation tools to engage our classroom peers in learning about research through doing.

### **What Was Learned?**

We found our student-peers, in general, have positive views of online classes. Many stated they could not have pursued furthering their education without the online distance delivery environment. The positive thing our peers said about online courses and learning, they are easy to manage, work great for flexible schedules, and when structured well allows for full participation and engagement in learning. However, there were some negative reviews as well, which are consistent with previous research, such as; the diminished capacity for authentic classroom discussion (Tu & McIsaac, 2002), a loss identity in the class (Sullivan, 2002), the loss of academic rigor (Dutton, Dutton, & Perry, 2002), and the lack of clear instruction and facilitation that some instructors demonstrate when teaching online classes.

In addition to these themes from our entire class, our peer from the satellite campus/center (off the main campus) identified the inability to engage and experience the personalities of their professors though online delivery. They also pointed to online delivery as being an interpersonal method of communication; however they reiterated that they would not be able to complete or even consider an advanced level of study without the ability to do it from a distance. Overall, however reflections from our classmates note the most common responses to online classes were; the removal of social fear of a classroom, the ease of use of an online learning environment, but the lack of 'deep' learning from an online classroom. There was even the sentiment that it was all about financial gain for the institutions since more students could enrolled in online classes without considering room capacity, however disregarding what allowed for the most effective student learning.

Patience showed itself to be a key element. There were times the technological issues (i.e. glitches) went beyond the knowledge of the group presenters, at times completely shutting off in the middle of a class. For example during one such moment our group was engaged in transferring data between the two sites using a whiteboard system. The system suddenly became unresponsive, leaving my peers and myself at a momentary loss for words, ideas, and understanding of how to fix it. However, we had planned and prepared for such events, thus we calmly deferred to the technologist and made light of the situation, which put the class further at ease with our lesson and the newness of the delivery situation. There were other technological problems with both the audio between the sites, and other times when our old Blackboard-style discussion tool failed, lucky thing we quickly adapted our lesson timeline by engaging in site-specific discussions keeping continued interest and forward movement in our lesson objectives.

We were ecstatic that the presentation went so smoothly and could even be deemed a success! The most essential skill we needed was patience. We knew from observing similar presentations in other classes that the most common problem and source of distraction is the interruptions and delay in audio and video technology from remote locations. The University's slower Internet

speed connection and the older technology on the satellite campus is a barrier that must be overcome for facilitate effective learning in the manner we describe. Recognizing the potential for delay in the audio and video from remote location can effectively be managed by consideration for presentation communication, in our case no one spoke over or ahead of each other, which is facilitated by advanced preparation and planning. In the end, we felt, as was confirmed by our peers and professors, this project was ultimately successful in our lesson-presentation objective because we were able to plan and assign clear and well-defined roles for our group members, as well as our ability to anticipate and navigate possible technological issues.

## Future Considerations

It is clear higher education is shifting away from textbooks and “brick and mortar” buildings, towards handheld technologies and virtual classroom (Roussey, 2012); however the downsides of this new age of education must be acknowledged and attended to. When implemented and used correctly, such as in our project, distance-learning classroom technology can be a useful and an extraordinary tool to connect students in different classroom, states, and countries. It is when these technologies are used improperly or ineffectively that leads to frustration and inattentiveness in the classroom.

Our group was able to utilize our generation’s understanding of technology to convey information, lead small-group discussions, and engage in a research study with two classrooms situated roughly a hundred miles apart. We were able to harness the power of these smart-classrooms in ways previously unseen at The University of Idaho, all of which was intentional. Careful planning, preparation, and heightened levels of patience allowed us to turn a ninety-minute group project into a research study, which virtually connected generations.

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## About the Authors

**Scott Barnicle** – [sbarnicle@uidaho.edu](mailto:sbarnicle@uidaho.edu): Scott is a second year doctoral student at the University of Idaho in Sport & Exercise Psychology. Scott graduated from Clemson University with a BA in Psychology, and Boston College with an MA in Counseling Psychology. Scott's research interests include sport enjoyment, motivation, and utilizing stress management skills in sport.

**Mary Orr** – [morrr@uidaho.edu](mailto:morrr@uidaho.edu): Mary T. Orr is a second year doctoral student at the University of Idaho in Curriculum and Instruction. She graduated from the University of Idaho a BA in Elementary Education and Special Education. She received an MS in Special Education. Mary's research interests include student diversity, distance education, and teacher instruction.

**Anne Kern, PhD** – [akern@uidaho.edu](mailto:akern@uidaho.edu): Anne L. Kern is an assistant professor in curriculum/instruction, science education at the University of Idaho. She researches methodologies in education, specifically in science teaching and learning, science teacher development, and science integration in STEM (science, technology, engineering, and mathematics). Her research focuses on using place-based pedagogies in understanding STEM content, particularly with American Indian students and communities.

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**Editor's Note:** Recruiting, selecting and admitting students is a significant cost to a university. Retention is also important, because when a student withdraws from a program, it represents a significant loss of time and money invested by the University and by the student. This paper examines factors that are important to retain students and prevent this loss of human capital.

## **Administrators' Perspective: An Examination of Factors that Influence Student Retention in Distance Education**

**Shabana Figueroa**  
USA

### **Abstract**

While there has been research on student retention in colleges and universities, little attention has been paid to the topic as it relates to online institutions, especially from the administrators' point of view. The purpose of this study is to examine factors that relate to student retention in distance education. A survey was constructed to test institutional interventions and student characteristics that influence student retention. Participants for the study included 65 institutions accredited by an Institutional Agency: Distance Education and Training Council, Accrediting Commission (DETC). In this study 25 respondents were asked to rate each of 43 items according to a 3 level response scale: 1 (major factor), 2 (moderate factor), and 3 (not a factor). Results indicated that institutional factors significantly contribute to student's retention.

**Keywords:** Student Retention, Distance Education, Higher Education

### **Introduction**

If the Universities and colleges fully understand 'What works and what does not' at their own institution, they can plan and implement strategies for improving the students' experience. While there has been research on student retention in colleges and universities, little attention has been paid to the topic as it relates to online institutions, especially from the administrators' point of view. Student retention includes the students' enrollment process, the duration of enrollment, completion of their degrees, and dropout rates. Institutional administrators, faculty, and students are key players in improving the current status of student retention at their institution.

Student retention is affected by the graduation rate, examination patterns, student's attitudes towards attrition, learning environment, and past trends. Institutional administrators can help students stay in school by creating and maintaining a positive learning environment (Lau, 2003). Students are expected to be self-regulated, motivated and demonstrate a sense of responsibility towards their own learning process. This warrants a discussion on student drop out. Some students leave because of external factors such as lack of finance, and change in academic goals.

Lau (2003) highlighted three factors to consider, first, the failure of an academic institution to provide students with an environment both in and out of the classroom that fosters learning. Secondly, change in the student educational needs and lastly, the inability of the student to manage his or her school workload. This has the effect of increasing student's stress levels and frustration and lead to their withdrawal from an academic program and institution. Effective measures that can be taken to improve student retention include the role of administrators, faculty and students. Institutional administrators must help students adjust to their new learning environment. Funding, academic support, management of multiculturalism and diversity, and physical facilities are factors that frame proper and effective college administration.

## Literature Review

The role of the faculty is crucial in this entire process because they have the ability to create and maintain a positive learning environment; thereby contributing to the overall institutional effort of providing a positive learning experience for the student. An instructor can contribute to the experience by placing emphasis on teaching and learning, encouraging cooperative and collaborative learning and by integrating academic advising into their teaching and communication with their students. On the other hand, the institution can contribute to process by providing access to academic computing labs, technical support, and instructional technology. It would be impossible to increase student retention without student involvement in the process. A strategy often deployed to increase student retention is the control of the quality online education programs. Many are of the impression that the quality of education in a distance education environment is not as good as the convention means of learning and teaching in a traditional environment (Davies, Doube, Lawrence-Fowler, & Shaffer, 2001). Davies, Doube, Lawrence-Fowler, and Shaffer (2001) describe distance education as a combination of student support and material production. The efficiency in the two will result in a higher quality of education. Lawrence-Fowler (cited by Davies, Doube, Lawrence-Fowler, & Shaffer, 2001) discusses quality control in three aspects: the quality of the course materials, the quality of presentation, and the quality of the services the students receive at the institution. McClenney and Waiwaiolo (2005) suggests six strategies, creating student success courses (courses that introduce the students to the campus environment), learning communities, effective academic advising, institutional (includes all campus constituents) acceptance of their responsibility in the process, learning support, and hiring the right people for the job. It is important that colleges provide appropriate support and guidance to its students from the very start. It is vital that colleges encourage students to connect with their teachers. Effective Advising is an integral factor 'thrown into the mix' because it becomes a resource for students who may need guidance. There can be little improvement if the right people are not hired. Creating a student centered environment requires a plan and the appropriate weapons of enforcement that is one that is both effective and consistent.

It is important that institutions make visible their commitment to creating and maintaining a positive learning experience for their sophomore students. This can be established is by providing mandatory advising sessions towards the end of the freshmen year, sending end and start of year letters to the new sophomore students, hosting a welcome back event at the beginning of the second year, ad by inviting sophomores to participate in freshmen seminars (Neely, 2005). Neely (2005) emphasized that by helping first-year students, sophomores are likely to feel a sense of belonging thereby providing a sense of community and a desired commitment to staying. Large attrition creates somber consequences for both students and the academic institutions. For institutions, high dropout rates reduce tuition and fees revenues that are used to support current and new academic programs.

In Habley and McClanahan 2004 study, 1061 institutions (two-year public and private, and four-year public and private) were asked to identify three campus retention practices that had the greatest impact on student retention. The survey respondents identified, freshman seminar (13.1%), tutoring program (13.1%), advising interventions with selected student populations (12.6%), mandated course placement testing program (10.7%), and comprehensive learning assistance (10.4%). The results indicated that 51.7 percent of campuses have an individual responsible for coordinating and implementing retention strategies, while 47 percent of campuses have established goals for retention of students from the first to the second year and 33.1 percent of campuses have established a goal for improved degree completion. The results indicate that institutions are more likely to attribute retention rates to student characteristics than there are to institutional characteristics. Retention practices are responsible for the greatest contribution to

retention in all survey colleges. It would be worthwhile for institutions to select a visible individual to organize campus wide planning teams and activities, conduct a systematic analysis of students (focusing on student and institutional characteristics), and establish realistic short and long term retention strategies (Habley & McClanahan 2004).

## Research Design

The purpose of this study is to examine factors that relate to student retention in distance education. The research was guided by two research questions. The first question, what factors influence a student's decision to stay or leave the college/university? The second question, how these factors contribute to student's decision to withdraw or stay in school? This study used the Association for Educational Communications and Technology (AECT) organization definition of distance education. AECT (2005) defines distance education as "institution-based, formal education where the learning group is separated, and where interactive telecommunications systems are used to connect learners, resources, and instructors."

The population sample included 65 degree granting and postsecondary institutions accredited by the Distance Education Training Council (DETC) in the United States. The respondents consisted of school administrators identified by the Chief Information Officer or Academic Dean of the institution. The DETC Accrediting Commission identifies and accredits distance education and training institutions that have attained and maintained the established standards. The DETC is recognized by the U.S. Department of Education as a nationally recognized accrediting agency and by the Council for Higher Education Accreditation (DETC, 2006). The average age of the students is 34, 47% of the students are male and 53% are female. In the degree granting institutions the average age of students attending is 37, 55% of the students are male and 45% are female.

The survey instrument was created using the constructed table and a modified version of the survey instrument developed by the ACT and the National Center for Higher Education Management Systems (NCHEMS, McClanahan, 2004). The survey used in the study consisted of 43 questions with a 3 level response scale (1= Not a factor; 2= Moderate Factor; 3= Major Factor). The survey was divided into three sections, institutional factors, students' characteristics, and institutional programs and services. In the institutional factors section, respondents were asked to identify the degree to which they contribute to student retention. In the second section, the participants were asked to do the same with student characteristics and their contribution to retention. In the last section, the participants were presented with a series of institutional programs and services that contribute to student retention and were asked to identify the programs and services offered by their institution. In addition to identifying the factors, they were then asked to select the degree to which the program or service contribute to student retention.

First, a pre-survey letter was sent to the Chief Academic Officer of each of the 65 institutions to announce the survey and request the name of the relevant personnel for which the survey should be mailed. Three weeks after, a survey letter containing the link to the survey was emailed to the person recommended by the academic officer. A total of 9 (13.8%) surveys were completed.

## Data Analysis

The data from the 25 survey responses was gathered and inputted analyzed via SPSS where frequency reports were generated to compute percentages, means and the standard deviation. The frequency reports were used to present an overall impression of the data. Next, the results were categorized into two categories, institutional factors and student factors. Institutional factors contained the sub category of institutional programs and services. Each category was analyzed to identify the majors that contribute to retention using a 3 level response scale (1= Not a factor, 2=Moderate factor, 3= Major factor). Institutional factors were expanded to show selected

intervention programs and services and the degree to which they relate to student retention. Once this was achieved, the results were compared to statements made in the literature review.

## Findings

Of the 25 institutions that responded to the survey, 9 factors were identified as major factors that contribute to student retention: Quality of teaching (80%), Course design (80%), Attitude of Campus Administration (60%), Academic Support services (60%), and the Use of Technology (60%), Attitude of the Campus Faculty (56%), Application of Learning Modules (52%), Admission Requirements (48%), and the Variety of Courses Offered (48%). Table 1 below indicates the major institutional factors that relate to student retention as identified by the participants.

**Table 1**  
**Relationship between Major Institutional Factors and Retention**

<b>Factors</b>	<b>Frequency</b>	<b>Percent</b>	<b>Mean</b>	<b>Std. Deviation</b>
Quality of teaching	20	80.0	2.80	.408
Course design	20	80.0	2.80	.408
Attitude of campus administration	15	60.0	2.56	.583
Academic support services	15	60.0	2.60	.500
Use of technology	15	60.0	2.56	.583
Attitude of campus faculty	14	56.0	2.32	.852
Application of learning modules	13	52.0	2.20	.913
Admission requirements	12	48.0	2.22	.866
Variety of courses offered	12	48.0	2.46	.588

**N=25**

The participants identified two factors that were considered as moderate factors affecting student retention in distance education: The Number of Courses Offered (68%) and Academic Advising (60%). They also identified several factors that they believe were not contributing to student retention: Extracurricular programs/activities (80%), Campus Life (84%), Social Environment (76%), Admission Tests (68%), Amount of Financial Aide (56%), Cultural Environment (56%), and Student Employment (52%) as factors that do not relate to student retention (Table 2).

When respondents were asked to identify campus retention practices at their institution, more than half of the participants identified these practices: Campus programs (88%), Learning Support Centers (76%), Intervention Programs (60%) such as Early Warnings, First year programs (56%) and Career planning and placement programs (56%). Several other practices were also identified as factors have moderate effects on student retention: Assessment programs (48%), Faculty programs (40%), Mentoring programs (20%) and Academic advising programs (8.3%) (Table 4). Over 50 percent of the survey responses show that Academic advising programs, Faculty programs and Assessment programs were not offered (Table 5).

**Table 2**  
**Relationship between Major Institutional Factors and Retention**

<b>Factors</b>	<b>Frequency</b>	<b>Percent</b>	<b>Mean</b>	<b>Std. Deviation</b>
Extracurricular programs/activities	22	88.0	1.12	.332
Campus life	21	84.0	1.24	.597
Social environment	19	76.0	1.24	.436
Admission tests	17	68.0	1.40	.645
Amount of financial aid offered	14	56.0	1.64	.810
Cultural environment	14	56.0	1.56	.712
Student employment opportunities	13	52.0	1.64	.757
Available financial aide	11	44.0	1.76	.779

N=25

**Table 3**  
**Institutional Programs and Services Offered**

<b>Programs and Services</b>	<b>Frequency</b>	<b>Percent</b>	<b>Mean</b>
Campus programs	22	88.0	2.88
Learning support centers	19	76.0	2.76
Intervention programs	15	60.0	2.24
First year programs	14	56.0	2.56
Career planning and placement programs	14	56.0	2.56
Assessment programs	12	48.0	2.48
Faculty programs	10	40.0	2.40
Mentoring programs	5	20.0	2.20
Academic advising programs	2	8.3	2.08

N=25

Of the programs and services selected, 78.9% of the participants indicated that Learning Support centers are major factors that relate to retention, 11 of the 15 survey responses show that Intervention programs, Assessment programs and Mentoring programs are cited as moderate factors, whereas Campus programs, First year programs, Career planning and placement programs and Faculty programs are identified as factors that do not relate to student retention.

**Table 4**  
**Institutional Programs and Services Not Offered**

<b>Programs and Services</b>	<b>Frequency</b>	<b>Percent</b>
Academic advising programs	22	88.0
Faculty programs	15	60.0
Assessment programs	13	52.0

N=25

**Table 5**  
**Institutional Programs and Services: Degree of contribution**

<b>Programs and Services</b>	<b>#</b>	<b>Frequency/Percent: Major Factor</b>	<b>Frequency/Percent: Moderate Factor</b>	<b>Frequency/Percent: Not a Factor</b>
Campus programs	22	0 (0)	1 (4.5%)	14 (63.6%)
Learning support centers	19	15 (78.9%)	6 ( )	9 (47.4%)
Intervention programs	15	4 (26.6%)	11 ( )	3 (20.0%)
First year programs	14	5 (35.7%)	5 ( )	7 (50.0%)
Career planning and placement programs	14	2 (14.3%)	6 ( )	10 (71.4%)
Assessment programs	12	5 (8.3%)	9 ( )	4 (75.0%)
Faculty programs	10	2 (20%)	9 ( )	11 (90.9%)
Mentoring programs	5	3 (60%)	7 ( )	5 (100%)

**Table 6**  
**Student Factors that Do Not Relate to Student Retention**

<b>Student Characteristics</b>	<b>Frequency</b>	<b>Percent</b>	<b>Mean</b>	<b>Std. Deviation</b>
Housing Arrangements	23	92.0	1.12	.440
Indecision about major	14	56.0	1.52	.653
Physical/or Mental issues	13	52.0	1.60	.707
Lack of preparation for college	10	40.0	1.88	.833

Table 6 provides an overview of the number of institutions that selected programs and services offered by their institution, along with the degree to which the factors were deemed as major, moderate and insignificant.

### **Student Characteristics**

Of the 25 survey responses, 44% choose factor 1 as a major factor, and 52% choose factor 2 as a moderate factor. Housing arrangements, indecision about major, Physical and mental issues, and Lack of preparation for college were selected as factors that do not relate to student retention. The Table 6 provides an overview of factors that do not relate to student retention.

### **Discussion**

The data analysis findings answered the two research questions. The first question is from the administrators' perspective, what factors influence a student's decision to stay or leave the college/university? The survey respondents included degree granting institutions and postsecondary schools. The survey results demonstrated that institutions are far more likely to contribute to student retention to institutional factors than they are to student characteristics. Of the 19 institutional characteristics contributing to student retention, the respondents identified five major factors that made major contributors, quality of teaching (80%), course design (80%), application of learning modules (72%), admission Requirements (48%) and academic Advising (20%). Of the 5 student characteristics lack of educational goals and objectives (28%), and lack of financial resources (48%) were cited as major contributors. Retention practices responsible for the greatest contribution to retention fall into three main categories, First-year programs.

The second question is that how these factors contribute to student's decision to withdraw or stay in school? The respondents identified, first-year programs (24%), academic advising programs (56%), assessment programs (20%), learning support services (24%), intervention programs (60%), mentoring programs (12%), and the remaining institutional programs and services were cited by less than 8%. In the review of the literature, Lau (2003) makes three arguments, institutional administrators, faculty and students play a vital role in student retention. The findings of the survey shows that institutional administration and faculty attitudes influence student retention, however, student factors were not identified as strong factors, in fact the only major factor selected was Lack of financial resources. Lau (2003) indicated that students drop-out of college because of their inability to manage normal school work. The survey showed that 52.0% of the respondents felt that students Lack of educational goals and objectives were moderate factors. It was unexpected to find that the Lack of preparation for college was considered as a non related factor by 40.0% of the respondents. Nealy (2005) highlighted that institutions should implement advising sessions, and offer motivation to first, and second year students. The study findings showed that 56% of the surveyed institutions offer First year programs and Campus programs while 88% do not offer Academic Advisement Programs.

### **Limitation and Suggestions**

The main limitation of the research study is it include 65 accredited institutions by one accredited agency, and does not include a larger list of all the colleges and universities that offer online degrees and programs that are accredited by any of the four recognized accrediting agencies. It is recommended for researchers who have similar interests to conduct a separate study and include students in the survey design. Further, the survey instrument was modified to include a three level response scale. This might have forced individuals to make a choice thereby causing the data to be skewed. It is recommended that this study be repeated using a four level response skill.

### **Recommendations to Administrators**

Providing the support for faculty is crucial when it comes to ensuring quality assurance. One way this can be achieved is to create a faculty development center that would assist instructors with the course design, development and implementation phases as well as provide technical support.

There are many colleges and universities that have faculty development centers that assist with the conversion of classroom based courses to the Course Management System, organize course websites, course design and integration into the Course Management System. Other centers develop a task force to support the development of online and other distance media instructional materials. It is further recommended that institutions create a system to assess online courses and programs to ensure the quality of courses designed and taught. These centers should consult with academic units in supporting the educational needs of distance learners.

To guarantee quality, standards and guidelines have to be created for instructors to follow in the course design and development process. These documents provide the medium for colleges and universities to announce their expectations. Next, institutions should create an evaluation system to determine student experience to allow for future improvements. Formative and Summative evaluations should be used. Formative evaluation may be conducted throughout a course/program to provide feedback to students, instructors and departments and summative evaluations may be conducted at the end of a course/program. There are various instruments that can be used in this type of evaluation. Examples include questionnaires, surveys, interviews, blackboard log files/course statistics, electronic portfolios, course assessments (exams, self tests, and pre/post test).

Create technical support for distance education students, perhaps a separate learning center for such students. Develop a comprehensive orientation course for online students (similar to the freshman seminar course). This approach will better equip students to micro manage their time, and effectively work in an online environment. In addition, institutions should provide technical support to students to facilitate the technology component of the learning forum. This can be enhanced by providing training live training sessions. Lastly, it would be necessary for all distance education institutions to review, and revised the advisement programs to facilitate online students.

## Conclusion

The research findings in this study adhere to the much of what was said in the literature. It an examination of institutional and student factors, it was clear that institutional practices have a direct relationship with students decision to drop-out or remain at the institution. The lack of financial resources on the part of the student was identified by the respondents as a major contributor to student retention. This is a factor that is not attributed to online learning environment but to the learning environment as a whole. The decision to drop-out is minimally based on the student's circumstance but more on the instructional practices.

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### ACKNOWLEDGEMENTS

The author is thankful to Dr. Habley and Dr. McClanahan who permitted the modification of the survey used in their study, 'What works in student retention.' This paper is written as the result of a study conducted for partial fulfillment of masters degree program at New York Institute of Technology, hence thanks is owed to Dr. Delores Burton, Associate Professor, for her guidance. Many thanks to Dr. Shiangkwei Wang, Associate Professor, New York Institute of Technology, and Dr. Wanjira Kinuthia, Associate Professor, Georgia State University, for their support and encouragement.

### About the Author



**Shabana Figueroa** is a PhD student in the Instructional Technology program in the department of Middle Secondary Education and Instructional Technology at Georgia State University. She also works at Spelman College as a Senior Instructional Technologist. Her research interests include educational technology in higher education, and technology enhanced learning environments.

[sfigueroa3@student.gsu.edu](mailto:sfigueroa3@student.gsu.edu)

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**Editor's Note:** This study looks at pre-service teachers' attitudes and proficiency in instructional design skills and ability to use instructional technologies to support teaching and learning.

## **Evaluation of Pre-Service Teachers' View on Material Design Skills and Using Technology in Education**

**Bahri Aydın, Süleyman Doğan, Hüseyin Kınay**  
Istanbul, Turkey

### **Abstract**

Teachers should be able to introduce and identify factors that contribute to the learning and teaching process. Teachers are expected to gain these competencies and performance indicators as pre-service teachers. This research is intended to determine the practice of instructional technology and the ability to design materials by students who are enrolled in the pedagogical formation certification program. To achieve this purpose, data will be collected by means of "Application Based Instructional Technologies and Material Design Skills Scale" developed by Varank & Ergun (2008) and by the "Determining the status of Educational Technology Scale" developed by Dogan (2010). These instruments will be sent via e-mail to 206 students who are enrolled at Fatih University Pedagogical Formation Certification Program. The data collected from the participants will be calculated with the help of SPSS. ANOVA, t-test and regression analysis will be used to analyze data and suggestions will be offered based on the results.

**Keywords:** Material design, pedagogic formation, instructional technology, using technology.

### **Introduction**

Education, when dealt with in terms of the system, is an institution that has inputs such as teacher, student, regulation, administrator, program, building, money and has output of educated human power. Educational systems aim at students gaining the designated goals. Hence, all other elements of the system are instruments. Teacher is one of the crucial elements in having students acquire specific goals.

This crucial role of a teacher originates from the fact that these acquisitions are effectuated by the teachers in classrooms. No matter how sufficient and competent are the programs, buildings, and administrators, desired results are not obtained if the teachers do not have required qualifications. Hence, classrooms are the places where theory turns into practical applications.

Eligibility of teachers would result in the qualification of the students to be trained. It is through the pre-service and in-service teacher trainings that the qualifications of teachers can be improved. The undergraduate courses that teachers receive before the service must be given appropriately.

General frame of the knowledge in 'general culture' and 'specific field' have been drawn by Education Ministry, General Directorate of Teacher Training and Education and their proficiency in training-teaching has designated. In the report, "planning, designing and developing the production of various instruction materials" are considered among significant proficiencies of a teacher (Ministry of Education, 2002).

Teachers must have some qualifications as they have crucial roles in having students achieve certain goals. Efficiency of teacher is the qualifications that teachers must have when they conduct their profession. 11<sup>th</sup> Education Council of the Ministry of Education designated new areas of qualifications in addition to general culture, field knowledge and teaching profession knowledge. The teaching profession field knowledge covers introduction of the foundations of education, introduction of Turkish educational system, ability to manifest school-community

relationship, introduction of teaching profession, drawing attraction to the development of the individual, ability to explain of learning, ability to introduce factors affecting the process of learning.

One of the competencies of the competence field of ability to introduce factors affecting the process of teaching is the ability to manifest effect of the use of technology and materials on learning. The followings are stated as the performance indicators of the competency: “sets forth the importance of the use of technology and material in teaching”, “explains the points to pay attention to in selection and usage of technologies and materials of teaching”, and “organizes activities that provide chances for the usage of various instructional technologies and materials”. Hence, teachers are supposed to design and use technology in their classrooms.

The course of “Instructional Technologies and Material Development” aims at having teacher candidates improve their computer skills, learn about the characteristics of various instructional technologies, their significance in the process of teaching and usage, develop teaching materials through teaching technologies (worksheets, transparencies, slides, video, computer-based course materials etc.) and evaluate materials of various characteristics (Higher Education Council, 1998).

Incredible developments in computer technology, “leads educationists reconsider basic principles, and restructure these new technologies for creative and productive new methods” (Kellner , 2002, p. 107). It is because such a development has paved the way for the concept of “information society”. Although the concept of “Information society” has not been defined clearly, the most distinct feature is its intensive use of computers and newly produced devices.

Feeling the responsibility to learn, students may benefit from technology in order to support their ideas. In parallel to the developing technology, many techniques about learning and teaching have been put forward. One of them is computer assisted teaching (Gürdal and others, 2001, p. 105).

Computer technology provides teachers with a huge number of opportunities in preparing teaching materials (Yalın, 2001). When the pictures, graphics and words are combined successfully, it has been observed that in comparison to traditional methods more positive learning atmospheres are built in maintaining the participants of the students and revivifying their rejoices. Through course programs, which are especially prepared for education, lessons can be offered more effectively, moreover by using characteristics such as text, sound and motion, the course can be made audio-visual (Şimşek, 1997).

It is stated that complex graphics, animations, sound and video in computer environment are important for interaction. Hence, in interactive teaching technologies, individualistic differences and learning styles are considered, it is emphasized that learners can achieve their goals (Tezci and Gürol, 2001). Akkoyunlu (2002) also stated that technology, which has a significant role in maintaining the development in education, is required to be integrated with their field of teaching by the educationists.

When the works in this field are looked at; Hu, Clark and Ma (2003), owing to the reasons originating from pre-service training of teachers, state that teachers in schools resist to the use of instructional technology. During their education, teachers are usually taught about the characteristics of instructional technologies, their place and significance in teaching process, however, their usages are not taught. On account of various reasons, many problems are faced in having prospective teachers acquire ability to learn the use of instructional technologies (Gündüz and Odabaşı, 2004).

## The Aim of the Research

The aim of this study is to analyze the opinions of prospective teachers about teaching technologies and material designing skills, and use of technology in education. Accordingly the following questions were attempted to be responded.

What are the opinions of prospective teachers on the use of instructional technologies and material design skills?

Do the opinions of teachers candidates on instructional technologies and material design skills show differences according to the following variations:

Gender

Marital status

Field of teaching

What are the relationships between the opinions of teachers on the skills of instructional technologies and material design, and use of technology in teaching?

## Significance of the Research

One of the competences that teachers must acquire and use is the competence of using instructional technologies. This competence must be acquired before the service and improved with in-service trainings. The research is also significant for the fact that it sets forth the opinions of teachers on whether they acquire teaching technology competences in certain levels before the service. Since assessment of the relationship of prospective teachers' skills of designing materials and teaching technologies with use of technology in teaching may measure the effect of the use of technology in designing materials, it has a functional aspect. Teacher candidates' use of technology and skills of material design have become an important daily issue for them to teach effectively and cope with the educational system of today. It has been observed that previous researches (Varank and Ergün, 2008) that assess the material design skills of the prospective teachers have not measured technology usage skill of the teacher candidates. There are works (Kabadayı, 2006; Demirer and others, 2009; Bekci and İzgi, 2007) conducted on the students of education faculties as teacher candidates. This research is considered to contribute to the field on account of the fact that it was carried out on the students of pedagogical formation program.

## Method

In this research, which aims at measuring the relationships between the skills of prospective teachers about teaching technologies and material designing and use of technology in education, scan type research method was used.

### 2.1. Population and Sampling

The target population of the study is consisted of 250 students at Pedagogical Formation Certificate Program of Fatih University. The students were sent scales through mail and 206 of the students filled the form up. Characteristics of the participants in respect to demographic variations are illustrated in Table 1. As seen in Table 1, 39.8 % of the participants study at Turkish Language and Literature, 10.7 % at History, 5.8 % at Physics, 3.9 % at Chemistry, 6.8 % at Biology, 7.8 % Philosophy Group, 5.8 % Geography, 4.9 % Foreign Language, 14.6 % Mathematics. 20.9 % of the participants are male while 79.1 % are female. Among the participants, 74.3 % are single and 25.7 % married.

**Table 1**  
**Demographic features of the participants**

<b>Personal Information</b>		<b>F</b>	<b>%</b>
<b>Department</b>	Turkish Language and Literature	82	39.8
	History	22	10.7
	Physics	12	5.8
	Chemistry	8	3.9
	Biology	14	6.8
	Philosophy Group	16	7.8
	Geography	12	5.8
	Foreign Language	10	4.9
	Maths	30	14.6
<b>Gender</b>	Male	43	20.9
	Female	163	79.1
<b>Marital status</b>	Married	53	25.7
	Single	153	74.3

## **2.2. Data Collection Tool, Process and Analysis**

In order to measure instructional technologies and material design skills of the teacher candidates, “Scale of Application-Based Teaching Technologies and Material Design Skills” developed by Varank and Ergün (2008) and “Scale of Designating State of the Application of Education Technology” developed by Doğan (2010) were sent by means of e-mail and the data collected in this way. In “Scale of Application-Based Teaching Technologies and Material Design Skills”, there are ratings of “I do not have”, “I am not sure whether I have or not”, “I have”, and “Absolutely I have”. As for “Scale of Designating State of the Application of Education Technology”, there are ratings of “I strongly disagree”, “I disagree”, “I have no opinion”, “I agree” and “I strongly agree”. The score intervals of the “Scale of Application-Based Teaching Technologies and Material Design Skills”, are for “I do not have” 1.00 – 1.74, for “I am not sure whether I have or not” 1.75 – 2.49, for “I have” 2.50 – 3.24 and for “Absolutely I have” 3.25 - 4.00. On the other hand, for “Scale of Designating State of the Application of Education Technology”, the score intervals are “I strongly disagree” 1.00-1.80, “I disagree” 1.81-2.60 “I have no opinion” 2.61-3.40, “I agree” 3.41-4.20 and “I strongly agree” 4.21-5.00. The data collected were interpreted in SPSS 15.0 program. T-test, ANOVA and Pearson Co-relation techniques were used in analyzing data.

## **Findings**

In this part of the research, findings related to the responses of the teacher candidates to the survey questions are discussed.

The opinions of the prospective teachers about instructional technologies and material design and use of technology in teaching are illustrated in Table 2.

**Table 2**  
**Opinions of Prospective Teachers about Instructional Technologies and Material Design Skills and Use of Technology in Teaching**

	N	$\bar{X}$
Instructional Technologies and Material Design Skills	206	134.3
Use of Technology in Teaching	206	102.8

As seen in Table 2, prospective teachers state that “they have” instructional technologies and material design skills. They “Strongly agree” with the use of technology in teaching.

The results of t-test, which was conducted for the significance of the difference of the skills of prospective teachers in instruction technologies and material design in respect to gender are illustrated in Table 3.

**Table 3**  
**T-test Results of Instructional Technologies and Material Design Scores in respect to gender**

Gender	N	$\bar{X}$	S	sd	t	p
Male	43	134.81	20.66	204	0.188	0.851
Female	163	134.17	19.96			

T-test results of instructional technologies and material design scores of the teachers in respect to gender do not show meaningful differences,  $t(204)=0.188$ ,  $p>0.05$ .

Results of T-test, which was conducted for the significance of the difference in respect to use of technology in teaching according to gender, are shown in Table 4.

**Table 4**  
**T-test results of use of technology in teaching in respect to gender**

Gender	N	$\bar{X}$	S	sd	t	p
Male	43	93.74	9.147	204	0.289	0.773
Female	163	93.3	8.915			

Prospective Teachers’ use of technology in teaching according to gender does not show significant difference,  $t(204)=0.188$ ,  $p>0.05$ .

Results of T-test, which was conducted for the significance of the difference in respect to use of technology in teaching according to marital status, are shown in Table-5.

**Table 5**  
**T-test results of use of Teaching technologies and Material Design Skill Scores in respect to marital status**

Marital Status	N	$\bar{X}$	S	sd	t	p
Single	153	132.56	19.58	204	2.140	0.034
Married	53	139.34	20.75			

Prospective Teachers' score of the use of technology in teaching according to marital status shows significant difference,  $t(204)=2.140$ ,  $p<0.05$ . Arithmetic average of those who are married ( $\bar{X}=139.34$ ), is higher than those who are single ( $\bar{X}=132.56$ ).

Results of T-test, which was conducted for the significance of the difference in respect to use of technology in teaching according to marital status, are shown in Table-6.

**Table 6**  
**T-Test Results of the Use of Technology in Teaching**  
**in respect to Marital Status**

Marital Status	N	$\bar{X}$	S	sd	t	p
Single	153	101.53	9.167	204	2.080	0.040
Married	53	106.57	9.595			

Prospective Teachers' use of technology in teaching show significant difference in respect to gender,  $t(204)=2.080$ ,  $p<0.05$ . Arithmetic average ( $\bar{X}=106.57$ ) of those who have marital status as married is higher than those ( $\bar{X}=101.53$ ) who have status of single.

Results of ANOVA, which was conducted for the significance of the difference in respect to the prospective teachers' scores of teaching technologies and material design according to their field of teaching, are shown in Table-7.

**Table 7**  
**ANOVA results of teaching technologies and material design scores**  
**in respect to the field of teaching**

Field of teaching	Total	sd	Average	F	P
Between Groups	3909.26	8	488.658	1.225	0.286
Within the groups	78614.077	197	399.056		
Total	82523.340	205			

Teaching technologies and material design scores of prospective teachers does not show significant difference in respect to the field of teaching,  $F(8,197)=1.225$ ,  $p>0.05$ .

Results of ANOVA, which was conducted for the significance of the difference in respect to the prospective teachers' scores of the use of technology according to their field of teaching, are shown in Table-8.

**Table 8**  
**ANOVA results of Use of technology in teaching**  
**in respect to the field of teaching**

Field of teaching	Total	sd	Average	F	P
Inter-groups	964.713	8	120.589	1.350	0.221
Within groups	17592.996	197	89.305		
Total	18557.709	205			

Prospective Teachers' use of technology does not show significant difference according to their field of teaching,  $F(8,197)=1.350$ ,  $p>0.05$ .

Test Results of Pearson Correlation, which was conducted to measure relationship between Teaching technologies and material design skill and use of technology in teaching, are given in Table 9.

**Table 9**  
**Test Results of Pearson Correlation, which was conducted to measure relationship between Teaching technologies and material design skill and use of technology in teaching**

		Material Design Skill	Use of Technology in teaching
Material design	Pearson Correlation	1	0.544(**)
	Sig. (2-tailed)		0.000
	N	206	206
Use of technology in teaching	Pearson Correlation	0.544(**)	1
	Sig. (2-tailed)	0.000	
	N	206	206

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

There is medium level, positive and significant difference between teaching technologies and material design skills and use of technology in teaching,  $r=0.544, p<0.05$ .

#### Simple Linear Regression Analysis

##### Coefficients(a)

		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
Model		B	Std. Error	Beta	B	Std. Error
1	(Constant)	16.365	12.794		1.279	0.202
	Technology Use in Education	1.147	0.124	0.544	9.258	.000

a Dependent Variable: Material Design Skills

A positive linear relationship has been found between material design skills and technology use in education. The effect size is moderate. The relationship between using technology in education and material design skills is significant ( $t=9.25, p=0.000$ ). As the points of technology use grows the material design skills also develop. This model can be used in predicting material design skills according to the technology use of the teachers in education.

$$Y_i = (b_0 + b_1IX_i) + \varepsilon_i = 16,365 + 1,147 * \text{Technology Use in Education}$$

## Results and Suggestions

When we look at the findings of the research, it is found out that teacher candidates see themselves as competent in use of technology and that they are in favor of the necessity of the use of technology in teaching. In respect to their gender, there is no difference in teacher candidates material design skills and use of technology in teaching. Male teacher candidates and female teacher candidates have the same level of material skills. Moreover, status of their use of technology in teaching is also not different. Material design skills of teacher candidates and their use of technology in teaching have not shown any difference in respect to their field of teaching. Teacher candidates in every field of teaching have the same level of material skills and their state of the use of technology is not different. However, there has been a difference according to their marital status. Married teacher candidates have more material skills and use of technology in teaching than unmarried teacher candidates.

According to the results of a research conducted on Biology teachers, 38.9 % of them never use computers, and 32.4 % do not use projector, 68.1 % the board, 17.8% educational CDs, 36.2 % internet, and 48.8 % computer laboratory (Taşçı and others, 2010). According to a similar research, science teachers use course book and additional question book most. Whiteboard, figures and tables are among the most widely used materials. Notice board and three dimensional models are used least. Television, video, film, cd, radio tape, and overhead projector are among the rarely used materials. We can draw a conclusion from these results that there is a difference between the idea of the necessity of the use of teaching technologies and use of them.

A medium level correlation was designated between teaching technologies and material design skills and use of technology in teaching. This indicates that there is a positive correlation between material design skill and technology. Teacher candidates using technologies have more material design skills.

This research is limited to 206 teacher candidates at pedagogical formation certificate program. It is thought that different results may be obtained from the researches depending on the experience, field of specialty, and whether the material design course was taken or not.

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## About the Authors

**Asst. Prof. Bahri Aydın** is a Faculty Member, Department of Educational Sciences, Faculty of Education, Fatih University  
e-mail: [bahriaydin@fatih.edu.tr](mailto:bahriaydin@fatih.edu.tr)

**Asst. Prof. Süleyman Doğan** is a Faculty Member, Department of Humanities and Social Sciences, Yıldız Technical University and Department of Educational Sciences, Faculty of Education, Fatih University  
e-mail: [sudogan@yildiz.edu.tr](mailto:sudogan@yildiz.edu.tr), [sdogan@fatih.edu.tr](mailto:sdogan@fatih.edu.tr)

**Hüseyin Kinay** is a Research Assistant, Department of Computer and Instructional Technologies, Faculty of Education, Fatih University  
e-mail: [hkinay@fatih.edu.tr](mailto:hkinay@fatih.edu.tr)

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