

## A Comparative Study of the Effectiveness of Traditional and E-Learning Education in Jordanian Universities

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### ABSTRACT

In this paper, we present a comparative analysis between the effectiveness of e-learning and traditional learning in computer engineering field in some Jordanian universities: namely the University of Jordan in Amman and the Al-Hussein Bin Talal University in Maan. In each university a course was taught by the same instructor in two different ways: one with traditional teaching and the second with blended teaching. In addition to the comparison of the results of students in these courses, two other parameters were analyzed as well: the scientific material coverage and the cost of each of them. Results of this research show that e-learning is more effective in the capital Amman than in Maan. Compared to traditional learning E-learning is slightly more effective in both universities.

**Keywords:** E-learning Education, Traditional Education, Comparative Study, Learning Effectiveness, Computer Engineering.

### 1. INTRODUCTION

The fast development and the increasing sophistication in information and communication technology has led to the expansion of its use in the fields of education, leading to more efficient forms of distance education, and the emergence of new patterns of learning which are more effective (Subhashini, 2011). Computer engineering specialization is one of the most fast growing disciplines in Jordan. The demand on this specialty during the years 2000 to 2008 was the highest among all engineering disciplines (Unified Acceptance Committee for the admission into Jordanian public universities, 2011). It is as well fast moving specialty in terms of curriculum contents and knowledge required by the graduate. From the other side the number of qualified staff in the field was very limited. All these circumstances imposed on the available staff a heavy load in terms of the number of teaching hours and the number of students per class. In addition, the staff members had to keep continuous update of the courses contents. A partial solution to this situation was the introduction of E-learning in delivering computer engineering courses. Due

to lack of resources needed, the E-learning environment elements were introduced step by step. The authors of this paper were among the first pioneers in the field of introducing e-learning in the universities of Jordan. It is worth mentioning that according to internationally adopted definition we did not implement pure E-learning, but blended E-learning where the classical education practices were mixed with those of E-learning. In our opinion, if circumstances allow, this may be the optimum way of learning. This opinion coincides with the findings of (Alaneme, 2010) who examined the preference of students on the issue of combining the traditional learning and e-learning. Alaneme revealed that students would prefer a combination of traditional and electronic modes of lecture delivery (Alaneme, 2010).

Introducing E-learning at the universities in which this study was made was very fruitful and gave a lot of advantages. Flexibility was one of most advantages felt by students. Online material allowed students to work asynchronously, and compensate certain deficiencies. The e-learning allow students to choose when and where they want to take their class. Part of this study investigated the performance of the students who missed some classes. However, students who are not enough motivated and acquainted to parents supervision and follow-up may not benefit fully from E-learning and may find that they quickly fall behind.

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Continuous education and equal opportunity was depicted as of the great advantage of the e-learning. The availability of the E-learning material without any restrictions on the access permitted previous graduates to update their knowledge, develop their skills and get the new material that they need. This provided the opportunity of continuous education to all students, present and past, irrespective of their financial status or geographic location and time suitability.

The communication facility offered by the e-learning was one of the most useful advantages of e-learning. Although E-learning provides a very easy and flexible communication tools we preferred to use messaging system and emails only when the student chooses that. Chatting and videoconferencing were almost not used. The local culture and social traditions make people more comfortable with face to face interaction. There were cases especially with female students where students communicated via emails more freely and with more openness and we felt that this was because they were shy to speak out during the class.

## 2. Requirements and constraints

### 2.1. Requirements

E-learning approach needs special facilities in term of audio, video and data equipments.

In order to claim that an institution is adopting E-learning approach, a set of requirements are to be satisfied. These requirements can be summarized as follows:

1. Infrastructure requirements. This includes classes with data shows, document camera, computer system and visual recording. Web-server with the capability of instantaneous web casting and replaying must be available.
2. Trained human resources to deliver and support the delivery of information.
3. Back office support in case digitization of material and/or some simulations are required.

In the event the institution has decided to go fully E-learning which can be called E-learning distance education, it shall provide:

1. Permanent headquarters of the departments and the various sections.
2. Place for the center that contains a computer technology equipment and technical support.
3. Faculty members and technicians to a high degree of

- scientific and practical efficiency.
4. Study Guides for each student.
5. Educational supervisor specialist for each subject of study.
6. Equipment software integrated basic education system.
7. A digital library containing resources and information sources in all forms and types.
8. Methods of communication between educational supervisor and student.
9. Clarity in the procedures of admission and registration.
10. Timetable for each subject.
11. Methods of assessment and tests in accordance with accepted standards.

### 2.2. Constraints

Adopting E-learning approach may face some obstacles among which:

1. The cost of infrastructure.
2. Need to train teachers, administration and students.
3. The process of converting educational material and curriculum into digital form in term of time, effort, money and expertise.

## 3. Questions of the study

The objective of this research paper had in mind to answer few of many questions related to E-learning namely:

- Is e-learning viable in the field of computer engineering education
- How effective is e-learning compared to traditional learning in computer engineering field?
- What factors may influence the effectiveness of e-learning?
- What is the effect of e-learning on the coverage of the material?

The study of E-learning effectiveness has recently been a subject of great interest to researchers (Zafra, 2011; Coleman, 1998; Kenneth, 2003; Jodi, 2002; Halawi, 2009; Kummerow, 2012). Each of these references investigated the effectiveness of E-learning in a certain field of education. This research investigates the effectiveness of E-learning in education in the field of computer engineering. The impacts and effects of local specificities in terms of culture and infrastructure availability were included in the results of the study.

In order to investigate the effectiveness of E-learning approach compared to traditional learning we decided to teach the same course by the same instructor in two

different ways: E-learning and traditional.

**3.1. Materials and Methods**

**1. Traditional Teaching.**

During the delivery of this course, traditional way of teaching using blackboards or whiteboards was used

**2. E-learning**

During the delivery of this course PowerPoint presentations, video lectures and simulation online examples were provided. The students were given several video lectures to supplement the lectures given by us, Educational films were as well provided.

**3.2. The study sample**

As a study sample of this study students from two universities in Jordan were selected. In the University of Jordan students enrolling a 4-5 year level course “Digital System design” were chosen. Two subsequent semesters were taken. During the first semester the number of students was 61 and the course was taught in the traditional classical way. In this paper it is denoted as course B. During the second semester the number of

students was 51 and the course was taught using E-learning approach. In this paper it is denoted as course B’ In the Al-Hussein Bin Talal university students enrolling a 2-3 year level course “Microprocessors and Assembly Language ” were chosen. Two subsequent semesters were taken. During the first semester the number of students was 53 and the course was taught in the traditional classical way. In this paper it is denoted as course A. During the second semester the number of students was 63 and the course was taught using E-learning In this paper it is denoted as course A’

**3.3. Limitations**

The present study has several limitations. One limitation is that it used only computer engineering undergraduate students. A second limitation is the relatively small sample group. The learning progress of students was not studied.

**4. Results**

Students’ results on a 100 scale are listed in the table 1.

**Table 1: grades of the four subgroups of students**

Student #	Students grades			
	Course A	Course A'	Course B	Course B'
1	72	68	74	82
2	65	68	65	65
3	65	84	54	64
4	80	78	85	65
5	46	75	75	71
6	51	69	76	70
7	76	75	70	94
8	79	54	90	56
9	45	65	94	85
10	73	68	82	87
11	75	69	65	74
12	68	61	64	70
13	67	90	65	78
14	67	85	71	85
15	34	87	70	90
16	90	65	45	94
17	87	75	74	82
18	56	94	65	65
19	64	65	62	64
20	56	84	85	65
21	73	82	54	84
22	87	82	55	56
23	76	87	69	89

24	73	74	60	92
25	76	55	56	94
26	87	41	75	81
27	45	39	70	71
28	48	45	72	75
29	86	42	72	75
30	91	59	45	65
31	84	58	65	64
32	85	64	58	65
33	72	65	58	70
34	46	65	94	85
35	35	95	56	35
36	38	72	85	71
37	68	94	87	70
38	90	59	64	85
39	58	67	60	92
40	57	78	54	82
41	86	65	55	84
42	75	95	65	75
43	66	68	67	76
44	69	75	60	70
45	72	72	85	92
46	37	40	86	75
47	36	39	35	65
48	84	88	82	63
49	85	74	54	72
50	80	85	65	
51	67	92	41	
52		78	85	
53		65	92	
54		81	82	
55		87	74	
56		74	78	
57		75	80	
58		90	54	
59		75	68	
60		63		
61		87		
Average	67.6078	71.63934	68.61017	75.0816

where:

Course A: microprocessors and assembly language classical

Course A': microprocessors and assembly language e-learning

Course B : Digital system design classical

Course B' : Digital system design e-learning

## 5. Results Analysis

Results of students at both universities taught by two

different methods were analyzed using SPSS software. The main results of analysis are provided in the following figures:

A series of T-tests on different aspects of the results was performed. The results of these tests are provided in tables 2 to 7.

## 6. Discussion of results and conclusions

The analysis of the results revealed several facts and conclusions among which are:

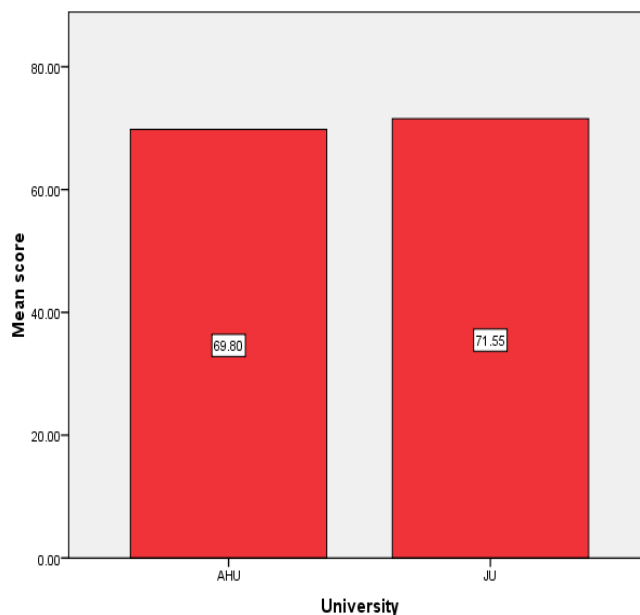


Figure 1. Means score of students at the two universities

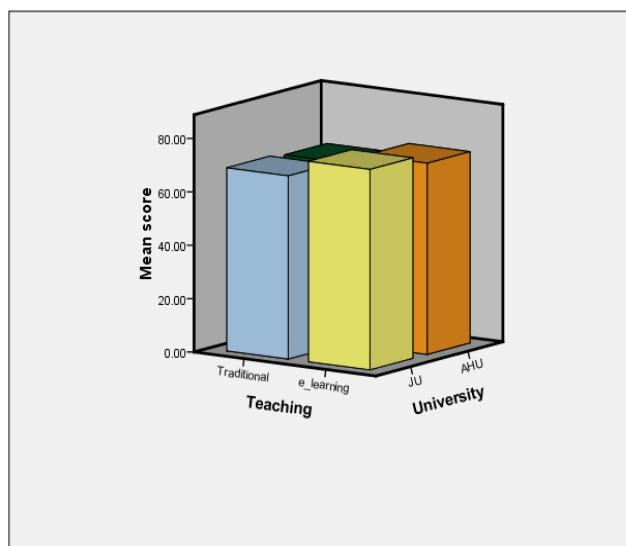


Figure 2. Means score of students at different universities and taught by different methods

Table 2. T-test for comparing traditional and e-learning methods for all samples

Teaching	N	Mean	Std. Dev.	T-value	DF	Sig. level
Traditional	110	68.1455	14.912	2.61	218	.010
e_learning	110	73.1727	13.634			

Table 3. T-test for comparing AHU and JU universities for all samples

University	N	Mean	Std. Dev.	T-Value	DF	Sig. Level
AHU	112	69.8036	15.5783	.89	218	.373.
JU	108	71.5463	13.2498			

**Table 4. T-test for comparing AHU and JU universities upon traditional teaching**

University	N	Mean	Std. Deviation	T-value	DF	Sig. Level
Scor AHU	51	67.6078	16.44880	.35	108	.727
e JU	59	68.6102	13.57104			

**Table 5. T-test for comparing AHU and JU universities upon e-learning teaching**

University	N	Mean	Std. Deviation	T-Value	DF	Sig. Level
Scor AHU	61	71.6393	14.69584	1.32	108	.189
e JU	49	75.0816	12.06033			

**Table 6. T-test for comparing different teaching methods at AHU**

Teaching	N	Mean	Std. Deviation	T-Value	DF	Sig. Level
Score Traditional	51	67.6078	16.44880	1.36	110	.174
e_learning	61	71.6393	14.69584			

**Table 7. T-test for comparing different teaching methods at JU**

Teaching	N	Mean	Std. Deviation	T-Value	DF	Sig. Level
score Traditional	59	68.6102	13.57104	2.59	106	.011
e_learning	49	75.0816	12.06033			

- From table 2 we can state that there are statistical differences between the means of traditional and e-learning teaching methods. The mean for traditional teaching method is equal to (68.15) on the achievement test, while it is (73.17) for the e-learning teaching method. This means that students who were taught by e-learning method have higher achievement or scores on the test compared with those who were taught by traditional teaching method.
- There are statistical differences between the means of traditional and e-learning teaching methods in JU while these differences are very minor in AHU. This confirms the fact that the availability of the infrastructure is a main factor in the effectiveness of e-learning. The availability of high speed internet connection, that is available in Amman and not as good in Maan clearly explains tables 6 and 7.
- Upon E-learning the instructor covered the material in a very comfortable way. The results clearly suggest that carefully designed courseware can lead to a large reduction in teaching time,. The time gained has been used for additional practical work and tutorial support.. This confirms the findings of (Sumathi, 2010).
- From oral sources we can state that the findings of (Ching-Hong ,2011) concerning class satisfaction between traditional face-to face learning and e-learning holds.

## REFERENCES

- Alaneme, Gloria, C., Olayiwola, Peter O., Reju, Comfort O. 2010. Combining traditional learning and the E-learning Methods in Higher Distance Education: Assessing learners' preference, 4<sup>th</sup> International conference on distance learning and education(ICDLE), IEEE.
- Coleman, J. Nicholas, Kinniment, David, J., Burns, Francis P., Butler, Timothy J. and Koelmans M. Albert. 1998. Effectiveness of Computer-Aide Learning as a Direct

- Replacement for Lecturing in Degree-Level Electronics. *IEEE transactions on Education*, 41 (3).
- Data from the Unified Acceptance Committee for the admission into Jordanian public universities.
- Jodi, L. 2002. Longitudinal Analysis of Student Performance in a Dental Hygiene Distance Education Program, *Journal of Dental Education*, 66 (9).
- Kenneth, G. and Elaine, L. 2003. Distance Education in the U.S. and Canadian Undergraduate Dental Curriculum *Journal of Dental Education*, 67 (4).
- Kummerow, Andreas, Miller, Marcia and Reed, Rhonda. 2012. Baccalaureate Courses for Nurses Online and on Campus: A Comparison of Learning Outcomes, *American Journal of Distance Education*, 26 (1): 50-65.
- Liu, Ching-Hong. 2010. The comparison of Learning Effectiveness between Traditional face-to face learning and e-learning among goal-oriented users, 6<sup>th</sup> international conference on digital content, *multimedia technology and its applications (IDC)*.
- McCarthy, Leila A. Halawi and Pire, Sandra. 2009. An Evaluation of E-Learning on the Basis of Blooms Taxonomy: An Explanatory Study, *Journal of Education for Business*, 84 (6): 374-380.
- Subhashini, A. and Sungaraj Samuel, R. 2011. E-learning, the next big name in education *Indian Journal of Science and Technology*, 4 (3): 173-178.
- Sumathi, D. 2010. E-Learning and Pedagogical Challenges, 4<sup>th</sup> *International Conference on Distance learning and Education (ICDLE) IEEE*.
- Zafra, Amelia, Gibaja, Eva, Luque, Maria, Ventura, Sabastian. 2011. An Evaluation of the Effectiveness of e-learning system as support for Traditional Classes. 7<sup>th</sup> *International conference on Next Generation Web services Practices IEEE*.

## دراسة مقارنة لفعالية التعليم التقليدي والتعليم الإلكتروني في جامعات أردنية

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### ملخص

نقدم في هذا البحث دراسة مقارنة لفعالية التدريس في تخصص هندسة الحاسوب بين التدريس التقليدي والتدريس الإلكتروني في بعض الجامعات الأردنية وبالتحديد الجامعة الأردنية في عمان وجامعة الحسين بن طلال في معان. في كل من الجامعتين تم تدريس نفس المادة ومن قبل نفس الأستاذ بطريقتين مختلفتين: التدريس الإلكتروني والتدريس التقليدي. بالإضافة إلى مقارنة نتائج الطلبة تم تحليل مقياسين آخرين: حجم تغطية المادة العلمية وتكاليف العملية التدريسية. دلت النتائج على أن فعالية التدريس الإلكتروني في الجامعة الأردنية في عمان أكثر من فعالية التدريس الإلكتروني في جامعة الحسين بن طلال في معان، وبالمقارنة مع التدريس التقليدي فإن فعالية التعليم الإلكتروني أكثر بقليل من التدريس التقليدي في كلتا الجامعتين.

**الكلمات الدالة:** التعليم الإلكتروني، التعليم التقليدي، دراسة مقارنة، فعالية التعلم، هندسة الحاسوب.

\* قسم هندسة الحاسوب، كلية الهندسة، الجامعة الأردنية. تاريخ استلام البحث 2012/12/12، وتاريخ قبوله 2013/5/30.