Review Article

A Study on the Application of the Information and Communication Technology Tools in the Learning Process of a Mechanical Engineering Undergraduate Program

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Keywords	Abstract
Information and Communication Technology, Engineering Education, ICT Usage, Undergraduate Level, Mechanical Engineering Students.	Information and Communication Technology (ICT) has an critical impact in engineering education. In this research, the mechanical engineering department of Eastern Mediterranean University (EMU) is examined for the usage of ICT by undergraduate students for learning purposes. The study was designed as a quantitative research. The study was attended by 102 students enrolled in EMU mechanical engineering undergraduate program in 2015 - 2016 academic years. The results were analyzed with SPSS software. As a result of the study, it is observed that the increase in computer usage and the increased availability of software tools significantly affect the learning behaviors and expectations of engineering students. The results show that the opinions of undergraduate students of the mechanical engineering department at EMU on the use of ICT for educational purposes were positive.

1. Introduction

Information and Communication Technology (ICT) has had a profound effect to change our life. It has attracted a considerable attention among communities in the world. So that usage of ICT has become an imperative fact in modern society. Many people and countries now pay attention for understanding ICT and learning the basic kills and concepts of ICT [1].

Nowadays, many ICT are being used in educational institutes, universities and higher educational institutes to teach the engineering science to the students, e.g. power points, internet, computer simulation software etc [1]. This matter has facilitated student to access to more information via digital mobile tools and interacts with more information. Furthermore, the use of such technologies for educational applications is highly supported by students. These opportunities help students to learn inside and outside the classroom, by developing more appropriate educational

materials. The concept of the computer experiment was discussed and developed. The use of computer graphics was illustrated with examples taken from current teaching material. Another new application of ICT in engineering education is the electronic mentoring of educational programs and engineering students at universities. This opportunity has been provided by ICT facilities as it is independent from geographical location and time constraints [3]. In fact, ICT provides some facilities like web- based via broadband connections that can help to access the educational resources from anywhere. For example, open courseware provides extra support to engineering students via the digital networks like Internet. Michael et al. [4] investigated the effect of ICTs on the education of engineering students. They employed ICT like video-conferencing facility in education process. They showed ICT is a strong tool for learning processes. They performed their evaluation via a questionnaire to investigate the usage of ICT in engineering education. González et al. [5] studied the ICT

usage for engineering student's educations in Spain. They showed that it is an important effect. They showed that the engineering students feel more satisfied if new ICTs are being implemented in the teaching process of courses. This study showed the positive effect of ICT on the graduate students' learning as well. They showed the ICT can provide better learning facilitates for the engineering students and increases the responsibility and motivation of them during the learning process.

To gain engineering education goals engineers should understand nature that goes beyond mere theory—knowledge that is traditionally gained in from the literature shows that there are rare or very few studies available on this topic. Investigation of ICTs usage in the learning process of engineering students is still an area that needs more attention. The main purpose of this article is to investigate the EMU mechanical engineering student's opinions on ICT usage for educational purposes. The main questions can be considered as what are the opinions of mechanical engineering students on ICT usage for educational purpose? What are the opinions of mechanical engineering student's ICT usage according to gender and educational background?

Some limitations can be seen in advanced:

1. There was only one full semester in the academic year of 2016-2017 available to perform this study.

2. Only a limited number of mechanical engineering students of EMU were available for performing the questionnaire.

The effect of ICT in education of mechanical engineering students of EMU will be investigated. The result of this study can help the university administration for the modification of course curriculums wherever which are needed. By having better knowledge about the effect of ICTs tool in the improvement of learning process of students, both side of university administration and students can have better impression. Indeed, it can help the university management to make some strategies and decision for improvement of ICTs facilities in the university according to the specific needs of university and students [1].

2. Engineering Education

Henderson and Broadbridge [2] explained lack of funding, poor material, students' population explosion (without equivalent facilities), poor high-quality workers (in terms of trainers or teachers), industrial practice and poor position of organizations as the principal problems handled by engineering education technological development follows as the main key problems to a nation's growth. On the other hand, usual engineering knowledge (acquired through suitable structures) plays an important character in the achievement of an elevated level of technological advancement.

Ali, et al. [6], investigated contemporary trends and techniques of technology in engineering education. They indicated that predictions trends and other various viewpoints of the latest situation in the use of technology based in the prior predictions and the experience in distance, on-line and on-class engineering education. In current century use of technology in the engineering education are increased. This modern technology provides new learning process in everywhere and in different learning model. These modern technologies are very common toward latest years. In additional, these impact in both traditional face to face systems as well as in on-line or distance models. In the last 10 years new use of information and communication technologies in the learning process effective before in the last part of the 20th century. Improvement and modernization of engineering are rapidly increased; therefore, this needs for engineering educators to adapt to new realities and learn contemporary trends (Ali, et al. 2010). In the past in several countries challenges and opportunities associating to engineering education and future paths and visions have been examined and a difference of views have been displayed. As Henderson and Broadbridge [2] have stated that ICT can help engineering students to get more knowledge about their major.

Bakare [7] investigated that ICT play a critical role in education. The goal of this study was examination the importance of ICT in education to reach better teaching and learning area of students. However, this study searched statistically of importance of ICT on student's Educational life in Eastern Mediterranean University. This study considerate 197 students in university of Eastern Mediterranean. The results showed that usage of ICT tools by students makes their work more flexible. Also, they were agreed that with use of ICT they can do their work quicker and better. The leads of the study showed that students studying in ICT saw lower issues than the students in other fields. Shirzadeh Shaghaghi [8] studied the effect of ICT on the education process of undergraduate students in mechanical engineering students of Eastern Mediterranean University. Alazam et al. [9] presented the levels of ICT skills and use of ICT in the classroom among technical and vocational teachers in Malaysia. They collected data from 329 technical and vocational participations of teachers. They investigated the skills of teachers in ICT, how teachers use ICT and their demographic factors. The study showed that skills of teachers in use of ICT were at average levels, also there were significant differences of skill of teachers in use of ICT as a function of demographic factors. In additional, there were meaningful relationship between ICT skills and ICT integration in classroom. Some factors related to the teachers like their ages, genders, teaching experiences, except level of educations did not impact ICT integration in classroom. Lorencowicz et al. [10] investigated the computers and internet access and usage by some students during their studies. The results were based on a survey in 2009-2012 on groups of 320 to 405 students (each year) of two universities in eastern areas of Poland. They concluded that the access of student's ICT facilities was at an elevated level.

The traditional professors realized that the students could not get the fundamentals of engineering design by using of software, but the younger professors found that they had some challenge in the experiment of this process. The students were happy with the new teaching methodology as they found it useful for their future working environment. Also, the advantages and disadvantages of usage of some ICT tools in a first-year technical drawing course were examined. The application ICT in mechanical engineering students were investigated in two universities. The

population of considered students for that study was 225 final year engineering students from two Kenyan technical universities that had mechanical engineering programme. The results of the study indicated the relationship between ICT and engineering education. To address these facts, the expansion of the curriculum in engineering education curriculum was proposed to include some courses like Computer Aided Design using modeling software, introduction to programming languages, Matlab, MathCAD and introduction to finite element modeling software [11].

It is accepted that the communication and technology are important to education [12]. However, due to the emerging of communication barriers in education, it is not an easy task to be fully accomplished. The ICT attitudes from 361 mechanical engineering students were investigated. The students used different ICT tool at work after their graduation. The ICT attitude was measured according to Likert scales [13] by SPSS software using descriptive statistics and Mann-Whitney test. The results showed the mechanical engineering students had positive ICT attitude.

3. Methodology

This study examines quantitative research. Quantitative methods indicate numerical analysis of data collected from surveys, questionnaires, and polls. Quantitative research focuses on collecting numerical data and concluding it beyond groups of people or to describe a special event. The main purpose of leading the quantitative research study is either to describe or to try the measured subjects before and after a treatment. Qualitative researchers now have the possibility to choose from an increasing array of theoretically and technically sophisticated methods.

The participates are the target group of undergraduate students of mechanical engineering department in EMU during the 2016 fall academic semester. The participants are from various countries with different ICT backgrounds.

A questionnaire is administered to the target group of undergraduate students of mechanical engineering department during the 2016 fall academic semester of Eastern Mediterranean University (EMU) in Northern Cyprus. Because of this research about gathering the data of ICT on Mechanical Engineering students. The questionnaire is based on five-point Likert scale. A psychometric response scale primarily used in questionnaires to obtain participant's preferences or degree of agreement with a statement or set of statements. Likert scales are a non-comparative scaling method and are unidimensional (only measure a single trait) in nature. Respondents are asked to show their level of agreement with a given statement by way of an ordinal scale.

Likert scales developed by Dr. Rensis Likert, who was a sociologist at the University of Michigan. His original report described "A Technique for the Measurement of Attitudes" was published in the Archives of Psychology in 1932 [13]. His aim was to improve averages of measuring psychological perspectives in a "scientific" approach. He attempted a method that would provide perspective measures that could rationally be described as measurements on a proper metric scale. Likert extended the principle of measuring characters by asking people to answer to a set of statements about a topic, in terms of the length to which they agree with them, and so drawing into the cognitive and affective parts of approaches. Likert-type or frequency scales use made decision reply formats and are designed to measure opinions or ideas (Likert, 1932). The main advances of this as A 5-point Likert scale is easy to collect the data owing to the fact of numbering of each option. In additional, as investigations can change from "one" to "five" or "low" to "high," it further provides extra reach than a simple yes/no question. A 5-point Likert scale illustrated the measure opinions of people. The questionnaire used to gather data consisted of three parts; the first part gathered demographic characteristics (e.g., gender), and computer and Web experience (e.g., PC ownership, Web-usage frequency, and Web-usage activities). In the second part, there were 24 questions, described by five-pointed Likert Scale (from "1= always", "2=usually", "3=sometimes", "4=seldom", to "5=never"). This section means to define the expectations of students in terms of their use of ICT and it is created to measure knowledge of the possibilities suggested by ICT. The last part obtained the student's point of view regarding the computers and ICT facilities of the faculty. Control questions were included to discover any incorrect data from the students in the questionnaire [1].

The aim of surveys is to gathering data based on impact of ICT tools on Mechanical Engineering students in Eastern Mediterranean University. The questionnaire is consisted of three sections similar with the work reported in Yaman et al. [1]. The first section of questionnaire is designed for the gather of demographic characteristics of participants like gender, age, department, type of attended high school, and sort of computer that they own and use; where they want mostly to make up their computer needs if they do not have a computer, what is the most objective to use computers of department, and the computer usage frequency of students per day. In the second section there were 24 questions, categorized by five-point Likert Scale according to the relevant question. This section aims to determine the expectations of students in terms of their use of ICT and it is designed to measure awareness of the opportunities offered by ICT. This section included student's use of computer for communication, courses and projects, or for entertainment purposes. Also, it considerate student's sufficient about using computers, connect to the internet with their mobile phone, frequency of use computers of faculty, using programs which are related to their profession, necessary of expressing a lesson through computer, usage of computer for their profession.

Furthermore, the questionnaire investigated student's usage frequency of email and search engines tools for courses and entertainment, and the frequency of use from the internet for student's projects and lessons, whether they can meet their needs (shopping) on the internet, frequency usage of computer for communication, lessons and projects and entertainment [1]. The last section elicited the student's point of view concerning the computers and ICT facilities of the faculty. This section included; number of computers that sufficient in department, meet of the hardware of department computers with student's needs, computer programs required in department by student's profession, whether the faculty members use the computers and information technology tools for communication, entertainment purposes

and homework/ projects purposes. In addition this study demonstrated announcements of university web pages, faculty web pages, department web pages, faculty members' web pages and communications and information services adequate, and adequate of presentations of course materials in the digital media, offered of the professional software by academician present and use in their department, efficiently use the professional software about their department, provide professional software need in their department when they need, professional software teachings will be useful to students in their professional life. Also, the students are asked whether they use the professional software and computer laboratories of department for their education, is the IT services of department enough good for the students and their educational activities [1]. Usually, mechanical engineering students in undergraduate level are using some technical software as SOLIDWORK, AUTOCAD and ANSYS. Furthermore, Microsoft office, social networks, and mobile communications are very common among them. These software and ICTs are developed by various international companies [1].

SPSS is used for the evaluation of data. SPSS Statistics is a software package used for logical batched and non-batched statistical analysis. Statistics involved in the base software are descriptive statistics, frequencies, Means and t-test and Anova. The reliability of the administrated questionnaire is measured by control questions. It is observed that 63.4% of collected data from students is valid. This indicates that the variables are reliable. The Cronbach's alpha, which takes on values between 0 and 1 for the consistency of the questionnaire, is calculated at 0.67 of the questionnaire. Therefore, it can be seen questions are independently reliable.

The statistical analyses of collected data for each part of questionnaire have been presented in this section. Also, student's opinions on objectives of computer usages have been shown. The items of first part can be seen in appendix of this work. It is seen that the students usually use computers their studies for research and projects and sometimes use them for entertainment. The questions and their calculated average values for descriptive statistics are given as fallow. Most of the students connected with mobile phone to internet. On the other hand, the average value of using computer of faculty and department of mechanical engineering for their education purposes is 2.79. The mean of use e-mail by mechanical engineering students of EMU is 4.29. Furthermore, usage of search engines tools for working on project or lesson is common among students in EMU mechanical engineering students and the average use of search engines tools like Google for entertainment is 4.36. But the means for meeting student's needs on internet like shopping is 2.74. Furthermore, the means of EMU mechanical engineering students for usage of faculty computers and information technology tools for communication and entertainment is 2.02 and for homework/projects purposes are 2.76. Mechanical engineering students in EMU use information and communication technology like mobile for connecting to internet, and they use email frequency. In additional, they use ICT tools for working on project and lesson; this shows a good usage of computer in the lecture by mechanical engineering students of EMU. In the same way, EMU mechanical engineering students are good usage of search engines for fun and entertainment. On the other hands, the mechanical engineering students of EMU are not interested to use computers of faculty and ICT tools for fun and communication and homework/ projects purposes. The average mean for requirement of expressing a lesson through computer is 4.17 and for essential of English language for computer usage is 4.28. Therefore, it shows that the mechanical engineering students of EMU need learn lesson through computer and they believe that knowing of English language is important. The average level of being confident about using computers and information is decreased. Also, they are seeing themselves not enough about computer usage and information technologies for their studies. Student's opinion about the need of usage computer for their profession is 4.23.

Furthermore, students believe about adequate of their ability to use computer for their profession is decreased. So, EMU mechanical engineering students indicate that they are less professional in using computer. On the other hands, the participant EMU mechanical engineering students responded that the computer usage is obligatory in their profession. The means of student's opinion of they don't connected to the internet with mobile is 1.73, and the average value of do not use much computer faculty is 3.36. Also, the means of student's opinion about do not use internet much in project and lesson is 2.04. Therefore, EMU mechanical engineering students show that they are using their mobile for accessing to internet. They are undecided to use computer of faculty.

On the other hands, they are interested to use internet much in projects and lessons. Student's view of point about satisfaction of number of computer in department. The average value of student's opinion about satisfaction of number of computer in department is 2.86. So, mechanical engineering students in EMU believe that the number of computer in department is few and department needs more computer facilities. The mean of student's opinions about convene of hardware of department computers with students require is 2.82 and this shows that mechanical students in EMU are agree that there is a lack of having access to the licensed professional and academic software. The average value of student's opinions about computer programs obligatory by student's profession is 3.52. Therefore, EMU mechanical engineering department computer hardware and specific subjects that are related to the educational programs are sufficient. Students believe about adequate of university, faculty and department web pages, announcements and communications.

The mean of student's opinion about adequate of announcements and communications services for university web pages is 3.69, for faculty web pages is 3.73. Also, the average value of student's opinion about adequate of department web pages and other information and communication services is 3.53, and for faculty members' web pages and other information and communication services are 3.68. Furthermore, the mean of presentations of course materials in the digital media is 3.70. Therefore, participants considered that the departmental and academic web pages are satisfactory in terms of making announcements and conveying information about the courses. Most of the students agree that there are advantages

of the use of specific educational programs for their future career.

4. Conclusions

The aim of this study is to investigate of information and computer technology usage of the undergraduate students of mechanical engineering students of Eastern Mediterranean University for educational purposes and the relationship between the gender and educational background of students and ICTs usage. In conclusion of mechanical engineering student's opinions of ICT usage for educational purpose, they are interested to use information and communication technology tools like mobile phone for connecting to internet, working on project and lesson and using email for communication. This shows a good usage of computer in the lecture by mechanical engineering students of EMU. Furthermore, EMU mechanical engineering students responded that the computer usage is obligatory in their profession. Mechanical engineering students in EMU believe that there is a need of having access to the licensed professional and academic software. However, ICTs facilities of EMU mechanical engineering department like the computer, video projectors etc. which are related to the educational programs, are sufficient.

The participants considered that the departmental and academic web pages are satisfactory in terms of making announcements and conveying information about the courses. Most of the students agree that there are advantages of the use of specific educational programs for their future career.

In investigate of mechanical engineering student's opinion of ICT usage according to gender and educational background, there is no significant different between male and female opinions in using information and communication technologies. In additional, students who graduated from super high school and classical high school are more interested to use ICT tools in their higher education. Because of the study, it is observed that the increase in computer usage and the increased availability of software tools significantly affect the learning behaviors and expectations of engineering students. In addition, the study concluded that the opinions of undergraduate students of the mechanical engineering department at EMU on the use of ICT for educational purposes were positive. For the future study, we will consider employing some techniques such as but not limited to [14-29].

Conflict of Interest Statement

The authors declare no conflict of interest.

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