Student's Perspectives of ICT Usage for Educational Purposes: a Case Study of EMU Mechanical Engineering

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ABSTRACT

Information and Communication Technology (ICT) has an important influence in engineering education. In this study, the department of mechanical engineering 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. 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.

Keywords: Information and Communication Technology (ICT), Engineering Education, ICT Usage, Undergraduate Level, Mechanical Engineering Students.

ÖZ

Bilgi ve İletişim Teknolojileri (BİT) mühendislik eğitiminde önemli bir etkiye sahiptir. Bu çalışmada, Doğu Akdeniz Üniversitesi (DAÜ) Makine Mühendisliği bölümünde lisans öğrencilerinin öğretim amaçlı olarak BİT kullanım durumlarını incelenmektedir.

Çalışma Nicel bir araştırma olarak tasarlanmıştır. Çalışmaya DAÜ Makine Mühendisliği lisans programına 2015 – 2016 öğretim yılında kayıtlı bulunan 102 öğrenci katılmıştır. Sonuçlar SPSS yazılımı ile analiz edilmiştir. Çalışma sonucunda, bilgisayar kullanımındaki artışın ve yazılım araçlarının artan kullanılabilirliğinin mühendislik öğrencilerinin öğrenme davranışlarını ve beklentilerini önemli ölçüde etkilediği gözlemlenmiştir. Ayrıca, çalışmada, DAÜ'deki makine mühendisliği bölümü lisans öğrencilerinin eğitim amaçlı olarak BİT'i kullanma durumlarına ilişkin görüşlerinin olumlu yönde olduğu sonucuna ulaşılmıştır.

Anahtar Kelimeler: Bilgi ve İletişim Teknolojileri (BİT), Mühendislik Eğitimi, BİT Kullanımı, Lisans Düzeyi, Makina Mühendisliği Öğrencileri.

To My Family

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INTRODUCTION

1.1 Background of the Study

Information and Communication Technology (ICT) has had a great 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 skills and concepts of ICT (Yaman et al., 2015).

ICT is important in education. New techniques have been added to the conventional education system such as Internet, electronic-learning, digital libraries, remote learning and assessment, mobile learning, simulations and interactive modeling, data sharing, remote laboratories and social networking (Palmer, 2000). It is very common to use personal computers, laptops, tablets and other digital hardware in the learning process and education (Seppälä, Sariola & Kynäslahti, 2002). Furthermore, the impact of computer use at on students' educational skills has been widly accepted (Kuhlemeier & Hemker, 2007). This is true alos for both male and female education (Fan & Li, 2005).

Also, ICT has an essential function in engineering education. Nowadays, many ICT are being used in educational institutes, universities and higher educational institutes to teach the engineering science to the students, e.g. powerpoints, internet, computer

simulation software etc (Yaman et al., 2015). ICT could to provide better opportunities for learning in engineering sciences such as computer aided modeling; computer programming, numerical modeling and analysis, digital communications, data storage and retrieval, computer-based learning, project planning, process controlling, budgeting and software development (Palmer, 2000).

Nowadays, engineering has evolved to satisfy the needs of people. Therefore, the educational curriculum for engineering science education has been modified to provide students with an optimum basis for their successful entry into the profession world. 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. Therefore, students are more capable to learn, understand and also take classes at own space and time (Henderson & Broadbridge, 2007).

There are several important ICT factors in engineering education. Smith (1976) described the usage of computer in education of engineering students. 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 (Mueller, 2004). 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. (2002) 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 (Michael et al. 2002).

González et al. (2013) 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.

Egoeze et al. (2014) showed also the considerable effect of ICT in education of engineering students They emphasized that the basic ICTs infrastructures are telephone, computer, network, data hub, printer, television, scanner, fax, digital camera, radio, video projector, video compact disks, microphone and software.

Triantafyllou (2015) explained that ICT can used to motivate the engineering students. He investigated and assessed the interventions to increase student motivation mathematics learning from the teaching methods and ICT-based learning environments point of views. It provided insights in student attitudes towards mathematics in an engineering study.

Trujillo et al. (2016) explained the usage of ICT in manufacturing and industrial engineering. They showed the grades of considered students were improved.

Lucke et al. (2016) showed the benefit of ICT usage in one engineering undergraduate course like fluid mechanics. Kumar and Kaur (2005) performed a study on the effect of ICT usage in Engineering Colleges in India. They showed that ICT tools like Internet is an important instrument for teaching activities, research and the learning processes.

One of studies on the application of ICT in the learning process of mechanical engineering students was performed by a professor and an academic librarian. They designed a project to increase students' technical and ICT skills. The main problem was how to incorporate ICT skills in a curriculum that is already on demand without omitting the current element of curriculum (Feldmann & Feldmann, 2002).

Usage of mobile learning devices and techniques has become attractive. Hocanın and Iscioglu (2014) showed the new generation of network and mobile environments and devices can help the teaching and learning process, by showing some novel advantage of ICT like its location independency of mobile users. The fast growth of ICT users can push educational organizations to use more from ICT like mobile technology in classroom daily activities. For example, mobile devices like tablets were becoming more popular in classrooms so that many instructors consider them as useful as pen or pencil.

Eid and Al-Jabri (2016) showed that social networking has a great effect in education. They indicated the significant and positive relationships between online

discussion, file sharing, knowledge sharing, entertainment and enjoyment with student learning.

One of wide spreading ICT-based methods is mobile learning. To examine the influencing factors in the adoption of mobile learning on students' academic achievement, students' backgrounds like age and employment status, self-efficacy, innovativeness, perceived ease of use of mobile, and some other factors were collected from students of a course in an online university in Korea. The result of their study showed the use of a mobile learning can positively influence the students' academic achievement (Han & Shin, 2016).

In a review paper by Zydney and Warner (2016) the effectiveness of mobile applications use in science learning was studied. It was showed that mobile applications offered a better design features.

Jou et al. (2016) showed that improvement of cloud technology can make to perform different tasks. They investigated the usefulness of E-books and application for each class in engineering courses. They considered a mechanical engineering course like course which has drawing with online books and other sources to use in theory and practice for teaching and performing an experiential study. The emphasized the positive effect of E-books and applications in development of better and more compatible learning materials in class.

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.

1.2 The Aim of Study

The main purpose of this thesis is to investigate the EMU mechanical engineering student's opinions on ICT usage for educational purposes.

1.2.1 Research Questions

1. What are the opinions of mechanical engineering students on ICT usage for educational purpose?
2. What are the opinions of mechanical engineering students ICT usage according to gender and educational background?

1.3 Limitations

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.

1.4 Importance

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 (Yaman et al., 2015).

Chapter 2

LITERATURE SURVEY

Students learn in several ways, some students learn by seeing and hearing, some of them learn by reflecting and acting, some students learn better with reasoning logically and intuitively. Some are memorizing and visualizing but some learn with drawing analogies and making mathematical patterns. In the same way, instructors have different teaching style, some educators make notes, some display or present; some attention to principles and others on statements; some maintain vision and others perception. Learning behaviors of most engineering students and teaching techniques of most engineering professors are opposite in many dimensions. Most of the engineering students learn better by visualizing, tasting, inductive, and working, and some of the most productive and creative students are global; most engineering education is hearing, geometric (intuitive), deductive, inactive, and constant. These mismatches manage to weak student achievement, professorial difficulty, and a loss to society of many possibly great engineers. While the various styles with which students learn are many, the addition of a moderately small number of methods in an instructor's collection should be enough to fit the requirements of most or all of the students in any class (Felder & Silverman 1988).

To gain engineering education goals engineers should have an understanding of nature that goes beyond mere theory—knowledge that is traditionally gained in

educational laboratories. However, the nature of these laboratories has changed after some years (Lyle, et al., 2005).

Today's engineering graduates require having powerful connection and cooperation abilities, but they don't (Smith, 1976). Conclusively, they are graduating with good information of basic engineering science and computer knowledge, but they don't know how to implement that in practice.

These can be summed as engineering education focused on professional programs and engineering science and without implementing the satisfactory combination of these topics or linking them to industrial practice, current programs do not produce enough design activities to students, graduates yet require interaction abilities and collaboration activity and programs require organizing more chances for students to improve these, programs must increase extra experience amongst students various education and constitutional problems and case of weakness of practical activities and experiences and teaching expertise in faculty students are not able to adequately relate theory to practice or provide design experiences. The strategies of existing teaching and learning in engineering programs are out of dated and require becoming update and using student-centered technique. Therefore, to overcome and solution most of these issues should design again significant of the program in engineering education, changed course accreditation rules by ABET, SARTOR and the IE Aust. It will means to help graduates for achieving the industry desired skills and qualities in the future, all of the engineering university and institutions in the Australia , UK, USA, and will require to improved revised teaching method, curriculum and course structures (Levin & Wadmany, 2006).

The prior studies showed that engineering is an integrative process and therefore engineering education, especially at the undergraduate level. This was approved also that there is need to reconstruct the engineering undergraduate education (Trujillo, et al, 2016).

Kiss and Kalagiakos (2012) investigated engineering classroom-based pedagogies of problem-based, engagement and cooperative learning. They discussed to improve student engagement in their learning and indicated theoretical roots and summary of practices. Instructors try to apply important aspect of meaningful learning through cooperative education, learning communities and problem-based learning.

2.1 Problems in Engineering Education

There is a general agreement between engineering educators, administrators, industry and business managers that engineering education in is in change or at least is going towards this way (Bhattacharya, 2008).

Henderson and Broadbridge (2007) 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 a high level of technological advancement. Most developing countries find it hard to affect sufficient knowledge and training to engineers at various levels of practice and training.

Palmer (2000) described problem-based learning (PBL), as a method in higher education. Problem-based learning has been performed for numerous sections. PBL has specific effect in engineering education.

Finally, the revision of course curriculum in undergraduate level for engineering education is need to consider the benefits of ICT as well (Richard, et al, 2000).

2.1.1 New Trends in Engineering Science Education

Ali, et al. (2010), investigated new trends and techniques of technology in engineering education. They indicated that predictions new trends and also 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 new technologies provide new learning process in everywhere and in different learning model. These new 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 new trends (Ali, et al. 2010)

In the past in several countries challenges (Michael, et al. 2002) and opportunities associating to engineering education and future paths and visions have been examined and a difference of views have been displayed. The challenges are

extensive and frequently distinct to the country or institution, and usually, include support. The opportunities are likewise changed, seldom being of a general nature but more often specific to the institution. Many opportunities lead to superior and innovative pedagogical strategies to teaching and facilitating learning. Some have described changes (González, et al, 2013) and reforms (Felder, 2000) happening in engineering education as well as its growth. Others have recommended totally rethinking engineering education or transforming it. Recommendations from various stakeholders, involving students, faculty, industry and society, have been put forward (Ogur & Ogola 2013), and future trends have been examined and prophesied (Ali, et al. 2010).

2.2 Importance of ICT Usage in Education

Kent and Facer (2004) indicated that school is an essential area to students engages in an extensive number of computer actions. Frequently, a number of studies showed that it can increase educational quality and connect learning to real-life conditions.

Latest studies have indicated that ICT aids in modifying a teaching area into a learner-centered. In the learning processes in ICT classrooms when students are engage involves, they are let by the instructor to make resolutions, plans, and so forth (Lu, et al. 2010). ICT, therefore, provides both students and teachers with more educational affordances and opportunities.

As Brush, González, et al, (2013) have pronounced, ICT is used as a tool for students to explore learning topics, solve problems, and provide solutions to the problems in the learning process. Students are now more commonly engaged in the significant use of computers. They create new knowledge and information within accessing, choosing, organizing, and evaluating information and data. Based on learning

through ICT, students are more able of using information and data from multiple sources, and critically estimating the quality of the learning materials.

According to constructive learning view, ICT assist learners to focus on theories more than less important tasks (Levin & Wadmany, 2006). There were statistically important relationships toward learning with ICT and the property of critical thinking skills.

2.3 Importance of ICT Usage in Engineering Education

Engineering educational should be considered as a source to address the global engineering talent shortage problems (Feldmann, & Feldmann 2002).

As Henderson and Broadbridge (2007) have stated that ICT can help engineering students to get more knowledge about their major. Further, Jou et al. (2016) indicated that ICT can help to provide better educational materials. It can help to improve the education level of students. With a combination of students' autonomy, capability, and creativity, the use of ICT can improve both teaching and learning quality.

Kabouridis (2004) mentioned the important role of teachers for implementing of ICT in engineering education. Also Lorencowicz et al. (2014) has indicated, ICT offers students more time to explore beyond the mechanics of course content allowing them to better understand concepts.

ICT is so powerful that it could transform traditional educational provision. The rapid growth of off-campus courses using this technology is an indication of things to come. ICT will almost certainly create a paradigm shift from institution-based, on-campus, teacher-centered education to learner-centered education, where students

using PCs at home or in the office create their own degrees (Lorencowicz et al. 2014).

2.4 Related Research

Livingstone (2012) investigated that ICT are widely used for enhancing of learning process. But ICT is not so embedded in the everyday life. The schools slowly change their lessons and plans to use computers in the classrooms. Therefore, society needs a transformation of technologically-mediated relation among teachers and learners.

Bakare (2014) investigated that ICT play a critical role in education. The goal of this study was examination the importance of ICT in education in order 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. These 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.

Alazam et al. (2012) 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 important differences of skill of teachers in use of ICT as a function of demographic factors. In additional, there were significant 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. (2014) 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 students ICT facilities was at a high level. In most of the years, there were significant differences in computer ownership and internet access among students from rural and urban areas.

The relationships between ICT, pedagogy, curriculum development, and practice in classroom setting were considered. They provided a conceptual structure for discovering inconsistencies in the usage and understanding of ICT at various levels of educational systems (Kuhlemeier & Hemker, 2007).

Su (2008) did a performance investigation on the university students who learned science via ICT. Eleven undergraduate courses were considered, while 676 students were involved in during 2005 academic year. The gender of students, use of computer and multimedia were also considered for this study. Some approaches for the incorporation of computer-based and multimedia teaching in utilization of student's understanding and attitude were proposed.

A study on engineering students was done during at least three semesters at a Malaysian college. The data collection was performed via a survey on the essay assignments of students. The results of this study showed that the students seriously

lacked the required skills and knowledge to evaluate internet information. Indeed, they could not identify the best efficient search method, to use scholarly resources, and to use information. It was realized that the most scholarly resources used were printed books, and most non-scholarly resources were electronics format. This study indicates that students need to use far more scholarly electronic resources in their courses (Ali, et al. 2010).

Pascual and Uribe (2006) discussed the active enhancement and learning in engineering education. The observed the reflection of competencies and past experience. As a result, the course program has been redesigned to achieve the required outcomes. They proposed an approach which was focused on a group-based design project. The goal was to design the strategies to manage critical equipments and plants. This included some techniques like focusing on the problem-solving oriented classrooms, innovative homework related to the needs of the students considering usage of ICT, and concept development. It was useful for new engineers with respect to the objective decision-making, team working and learning.

In India, engineering education has changed recently. This is due to tendency for having the high-quality education. The use of most advanced ICT like satellite called and virtual classrooms and laboratories were established. Some future trends are outlined like collaborative learning for providing better and high tech supports for the learners' interests and queries (Bhattacharya, 2008).

In fact, ICT was a vital element for educational evolutions (Mohamed Abdullah & Gulzar, 2016). There were several benefits of ICT in engineering education. A close look at the challenges related to ICT adoption and Utilization in engineering

education was discussed. Some ICT opportunities for integrating in engineering education and learning were discussed.

Despite the interesting features of ICT in education, and the advantages of these technological resources in the education sector, their use in engineering educational content delivery is lagging behind other educational disciplines. Some challenges were the quantitative nature of engineering field, lack of awareness of ICT usage approaches in education and the lack of a clear and suitable policy for engineering educational content delivery. Considering the available opportunities for utilization of ICT in computing, high speed internet, some actions should be taken still like proper utilization of ICT resources in engineering education. This could be the combination of face-to-face education with online learning in engineering education (Ali, 2014).

Kiss and Kalagiakos (2012) indicated that ICT is important to education. However, using ICT is not easy due to the emerging of communication barriers. The goal of this study was the analysis of ICT attitudes in different faculties at the Obuda University. The mechanical engineering students from the faculty of engineering and technical manager students from the Economics Faculty were considered. These students used different ICT tools at work after their graduation. It was important to know whether instructors should use different teaching methods for these two different groups. They considered 23 items according to the Likert scaled approach among 210 students. The descriptive statistics data analysis was performed with SPSS software. The results showed that all groups had a similar and positive ICT attitude.

Kabouridis (2010) presented the experiences gathered during the last three years of teaching a design course for a group of first-year mechanical engineering students. These students were lectured by the help of ICT tools. Also, they asked to produce some solutions for small engineering design problems by team working. The results of this approach were different among the professors. 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 (Ogur & Ogola, 2013).

ICT is actually a new approach in learning that can challenge the traditional teaching methods in mechanical engineering education. Some ICT approaches like E-learning is not only a service that provides the basic learning infrastructure, but also a new environment for the management of engineering education. The new challenges in

education changed the university staff structure, which established new positions and created new changes in the teaching methodology. This was possible by the understanding of ICT methodology. The results of educational process were investigated for the last three years of using some ICT approaches like the e-learning for the education quality improvement in Mechanical engineering department. It was realized that ICT should be integrated into the engineering education (Kabouridis, 2004).

In Botswana, in educational year of 2007-2008, E-learning was used in some of the mechanical engineering courses. An electronic questionnaire was used to a cohort of third year mechanical engineering students for this study. The questionnaire had 92 items that covered the facilities, access resources, quality and instruction issues. The results showed that students were receptive of ICT-based course delivery (Oladiran & Uziak, 2009).

It is accepted that the communication and technology are important to education (Kiss & Szasz, 2016). 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 by SPSS software using descriptive statistics and Mann-Whitney test. The results showed the mechanical engineering students had positive ICT attitude.

Chapter 3

METODOLOGY

In this chapter, the methodology including of research approach, type and number of participants, data collections tools and data analysis will be presented.

3.1 Research Method

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 (Babbie, et al, 2010).

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 (Sandelowski, 2000).

3.2 Participants

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.

Table 1. Previous school background of participation (high-school)

Type of high school graduation	n	%
Science High School	47	46,5
Super high School	13	12,9
Classical High School	20	19,8
Other	21	20,8
Total	101	100,0

Table 1 shows that 46.5% students who are graduate of science school, 12.9% ones of super schools, 19.8% ones of classical schools, 20.8% remained graduate of other different schools. It is clear that most of participants have been graduated from science high schools. Also, the smallest group of students is graduated from super high schools. This matter can be contributed to the economical level of students' family and their living environments.

Table 2. Gender distribution of participants

Gender	n	%
Female	25	24,8
Male	76	75,2
Total	101	100,0

As presented in Table 2, total numbers of students who completed the questionnaire is 101 students. There are 76 male students and 25 female students which contribute to 75.2% and 24.8%, respectively.

Table 3. Age distribution of participants

Age	n	%
18-20	59	58.4
21-23	23	22.8
24-29	11	11.0
30-33	8	8.0
Total	101	100,0

As pointed in Table 3, there are 59 students which contribute to questionnaire in 18-20 years old, which are 58.4% of total population. In the age of 21-23, the number of students is 23 students. Moreover, the number of students in the 24 to 29 age range reduced to 11% of total population. Also, in the age of 30-33, the number of students decline to 8%. Thus, the majority of students (59) are in the 18 to 20 age range. The number of students in 25 years old and over decreased.

Table 4. Personal computer ownership of participants

	n	%
Yes	85	84,2
No	10	9,9
Total	101	100,0

In Table 4, 84.2% of the 101 participants have their own computers. It shows that more than average of students owns a personal computer.

Table 5. Electronic device type

	n	%
Desktop	16	15,8
Notebook	36	35,6
Netbook	35	34,7
PDA	6	5,9
Total	93	92,1

Table 5 shows 15.8% (16 participation) have a desktop computer, 35.6% (36 participation) have notebooks, 34.7% (35 students) have a netebook, and only 5.9% (6 students) have a PDA. Therefore, the majority of students have notebooks and notebook.

Table 6. Make up of computing needs

	n	**%**
Friends	29	28,7
Internet cafe	18	17,8
Faculty	16	15,8
Other	14	13,9
Total	77	76,2

Table 6 indicates 9.9% (10 participation) without any computer equipments and also they improve them as an outside of the campus in which three ways; 28.7% (29 students) use their friend's computers, 17.8% (18 students) use computers at the facilities at Internet cafes and 15.8% (16 students) make up their computing needs of faculty. Only 13.9% (14 students) use from another way. So, the students mainly are using the faculty computers for their studies, when they have no access to a personal computer.

Table 7. Usage objective of faculty computers

	n	**%**
Lesson/Project	66	65,3
Communication	10	9,9
Entertainment	9	8,9
No, I do not use	15	14,9
Total	100	99,0

Table 7 shows which using of this computer of department; 65.3% of participant who respond the survey for using this instrument of faculty for lesson and project; 9.9% (10 students) used as a communication, 8.9% (9 students) used as an entertainment. However, that 14.9% (15 students) do not used at all. It shows that more than averages of students use faculty computers for working on lesson and project.

Table 8. Computer use (hours per day) of participants

	n	**%**
7 or more	6	5,9
4-7	27	26,7
2-4	42	41,6
0-2	20	19,8
Total	98	97,0
Total	101	100,0

Table 8 investigates daily computer use behavior of students. It shows that 19.8% of participants use computer less than 2 hours per day, 41.6% of students use computer between 2 and 4 hours per day. Moreover, 26,7% of participant who respond the survey for using this instrument 4-7 hours a day and 5.9% of them use computer more than 7 hours per day. Therefore, they are using in average about 2-4 hours a day from computer.

3.3 Data Collection Tool

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. As an result 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. His aim was to improve averages of measuring psychological perspectives in a "scientific" approach. Definitely, he attempted a method that would provide perspective measures that could rationally be described as measurements on a proper metric scale. Likert (1932) 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).

As Finstad (2010) indicated, according to Simply Psychology, 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 (Yaman et al. 2015).

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. (2015).

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 (Yaman et al., 2015).

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 (Yaman et al., 2015).

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 (Yaman et al., 2015).

3.4 Data Analysis

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.

3.5 Validity and Reliability

The reliability of the administrated questionnaire is measured by control questions.

Table 9. Reliability statistics results

Case Processing Summary			
		N	**%**
Cases	Valid	64	63,4
	Excluded[a]	37	36,6
	Total	101	100,0
a. Listwise deletion based on all variables in the procedure.			

Table 9 shows that 63.4% of collected data from students is valid. This indicates that the variables are reliable.

Table 10. Reliability statistics results

Reliability Statistics	
Cronbach's Alpha	N of Items
0,67	47

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. This can be seen in Table 10.

Chapter 4

FINDINGS

4.1 Opinions of mechanical engineering students on ICT usage for educational purposes

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 thesis. 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.

Table 11. Distribution and average value of computer usage objectives

Issues concerning ICT	**never**		**seldom**		**sometimes**		**usually**		**always**		**mean**
	n	%	n	%	n	%	n	%	n	%	
I'm using the computer for communication.	2	2.0	11	10.9	49	48.5	29	28.7	10	9.9	3.34
I'm using the computer for courses and projects	-	-	-	-	27	26.7	48	47.5	26	25.7	4.00
I'm using the computer for entertainment purposes	20	19.8	6	5.9	22	21.8	53	52.5	20	19.8	3.86
I connect to the internet with my mobile phone	2	2.0	6	5.9	6	5.9	17	16.8	70	69.3	**4.45**
I use computers of faculty	14	13.9	33	32.7	29	28.7	19	18.8	6	5.9	**2.70**

Table 11. Distribution and average value of computer usage objectives (Continued)

Issues concerning ICT	never		seldom		sometimes		usually		always		mean
	n	%	n	%	n	%	n	%	n	%	
I'm using programs which are related to my profession.	7	6.9	10	9.9	41	40.6	30	29.7	13	12.9	3.32
I use my e-mail	-	-	4	4.0	13	12.9	34	33.7	50	49.5	**4.29**
I use search engines (Google and similar) tools for courses / projects	2	2.0	4	4.0	8	7.9	27	26.7	60	59.4	**4.38**
I use search engines (Google and similar) tools for entertainment	4	4.0	2	2.0	15	14.9	13	12.9	67	66.3	**4.36**
I use the internet for my projects and lessons	1	1.0	2	2.0	31	30.7	33	32.7	34	33.7	3.96
I meet my needs (shopping) on the internet	12	11.9	28	27.7	39	38.6	14	13.9	6	5.9	**2.74**
I carry out my banking transactions on internet	16	15.8	23	22.8	24	23.8	22	21.8	15	14.9	2.97
I use faculty computers and information technology tools for communication and entertainment	47	46.5	18	17.8	22	21.8	6	5.9	5	5.0	**2.02**
I use faculty computers and information technology tools for homework/ projects purposes	11	10.9	33	32.7	28	27.7	16	15.8	8	7.9	**2.76**
The professional software is offered by academician present and use in my department	14	13.9	7	6.9	38	37.6	30	29.7	8	7.9	3.11
I efficiently use the professional software about my department	2	2.0	32	31.7	20	19.8	36	35.6	7	6.9	3.14

Table 11. Distribution and average value of computer usage objectives (Continued)

Issues concerning ICT	never		seldom		sometimes		usually		always		mean
	n	%	n	%	n	%	n	%	n	%	
I provide professional software need in my department when I need	16	15.8	27	26.7	25	24.8	26	25.7	3	3.0	3.72
The professional software teachings be useful to me in my professional life	8	7.9	1	1.0	22	21.8	33	32.7	33	32.7	3.85

Table 11 explains distribution and average value of computer usage objectives. As indicates Table 11 most of the students connected with mobile phone to internet (4.45). 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 (4.38) 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.

As shows Table 11, 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.

Table 12. Student's opinions about necessary of think expressing a lesson through computer and language skill

Issues concerning ICT	**Absolutely unnecessary**		**unnecessary**		**undecided**		**necessary**		**Absolutely necessary**		**mean**
	n	%	n	%	n	%	n	%	n	%	
I think expressing a lesson through computer is needed	17	16.8	-	-	-	-	51	50.5	33	32.7	**4.17**
English language is necessary for computer usage	-	-	4	4.0	21	20.8	19	18.8	57	56.4	**4.28**

Table 12 shows student's view of point about need of think expressing a lesson through computer and language skill. As Table 12 describes 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, this table shows that the mechanical engineering students of EMU need learn lesson through computer and also they believe that knowing of English language is really important.

Table 13. Student's opinions about the satisfaction usage of ICT

Issues concerning ICT	**certainly insufficient**		**insufficient**		**undecided**		**sufficient**		**certainly see myself sufficient**		**mean**
	n	%	n	%	n	%	n	%	n	%	
I see myself sufficient about using computers and information technologies	1	1.0	27	26.7	20	19.8	35	34.7	17	16.8	3.40

Table 13 discuses about student's opinions about the satisfaction usage of information and communication technologies. As Table 13 indicates the average level of being confident about using computers and information is decreased (3.40). Also, they are seeing themselves not enough about computer usage and information technologies for their studies.

Table 14. Student's opinions about the necessities of student's profession

Issues concerning ICT	**certainly not required**		**Not required**		**undecided**		**required**		**Certainly required**		**mean**
	n	%	n	%	n	%	n	%	n	%	
The computer usage is a requirement for my profession	-	-	-	-	13	12.9	52	51.5	36	35.6	**4.23**
My ability to use computer is enough for my profession	5	5.0	34	33.7	16	15.8	33	32.7	13	12.9	3.15

Table 14 explains student's opinions about the necessities of student's profession. In Table 14 the means of student's opinion about the need of usage computer for their profession is 4.23. Furthermore, student's believes about adequate of their ability to use computer for their profession is decreased (3.15).

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.

Table 15. Distribution and average value of computer usage aims

Issues concerning ICT	**certainly not agree**		**Not agree**		**undecided**		**agree**		**Certainly agree**		**mean**
	n	%	n	%	n	%	n	%	n	%	
I use the computer for communication	10	9.9	37	36.6	14	13.9	32	31.7	3	3.0	2.80
I use the computer for lessons and projects.	30	29.7	7	6.9	32	31.7	22	21.8	7	6.9	2.68
I use the computer for entertainment.	12	11.9	28	27.7	15	14.9	33	32.7	10	9.9	3.01
I'm seeing myself not enough about computer usage and information technologies?	33	32.7	9	8.9	34	33.7	21	20.8	1	1.0	2.47
I do not connect to the internet with my mobile phone.	62	61.4	12	11.9	10	9.9	7	6.9	4	4.0	**1.73**
I do not use computers much at faculty.	7	6.9	11	10.9	30	29.7	41	40.6	10	9.9	**3.36**
I do not use internet much in my projects and lessons.	34	33.7	35	34.7	21	20.8	7	6.9	1	1.0	**2.04**

Table 15 shows average value of computer usage goals. As Table 15 indicates that 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.

Table 16. Student's opinions about satisfaction of number of computer in department

Issues concerning ICT	Certainly not enough		Not enough		undecided		enough		Certainly enough		mean
	n	%	n	%	n	%	n	%	n	%	
I think the number of computers is sufficient in department	12	11.9	31	30.7	26	25.7	17	16.8	12	11.9	2.86

Table 16 discuses student's view of point about satisfaction of number of computer in department. As Table 16 shows that 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.

Table 17. Student's opinions about convene of hardware of department computers with students require

Issues concerning ICT	Certainly not meet		Not meet		undecided		meet		Certainly meet		mean
	n	%	n	%	n	%	n	%	n	%	
The hardware of department computers meet my needs	18	17.8	23	22.8	23	22.8	26	25.7	8	7.9	2.82

Table 17 explains student's opinions about arrange of hardware of department computers with students need. As Table 17 shows that 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.

Table 18. Student's opinions about computer programs required by student's profession

Issues concerning ICT	Have not required program		Has last part		undecided		Despite not all, it has large part		Have not require program		mean
	n	%	n	%	n	%	n	%	n	%	
Department has computer programs required by my profession	8	7.9	19	18.8	21	20.8	13	12.9	36	35.6	3.52

Table 18 shows student's view of point about computer programs required by student's profession. As Table 18 indicates that 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.

Table 19. Student's opinions about sufficient of university, faculty and department web pages, announcements and communications

Issues concerning ICT	Certainly not adequate		Not adequate		undecided		adequate		Certainly adequate		mean
	n	%	n	%	n	%	n	%	n	%	
University web pages, announcements and communications services are adequate	1	1.0	9	8.9	23	22.8	50	49.5	14	13.9	3.69
Faculty web pages, announcements and communications services are adequate	1	1.0	10	9.9	19	18.8	51	50.5	16	15.8	3.73
Department web pages and other information and communication services are adequate	1	1.0	13	12.9	31	30.7	37	36.6	15	14.9	3.53

Table 19. Student's opinions about sufficient of university, faculty and department web pages, announcements and communications (Continued)

Issues concerning ICT	Certainly not adequate		Not adequate		undecided		adequate		Certainly adequate		mean
	n	%	n	%	n	%	n	%	n	%	
Faculty members' web pages and other information and communication services are adequate	2	2.0	9	8.9	26	25.7	41	40.6	19	18.8	3.68
Presentations of course materials in the digital media are adequate	1	1.0	8	7.9	26	25.7	44	43.6	17	16.8	3.70

Table 19 shows student's believes about adequate of university, faculty and department web pages, announcements and communications. As Table 19 describes, that 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.

4.2 Opinion of Mechanical Engineering Students ICT Usage for Education Purposes According to Gender and Educational Background

This study investigated student's view of point in the relationship between gender in using ICT facilities and associate of student's high school graduate background and using information and communication technologies.

4.2.1 Mechanical Engineering Student's Opinion on Educational Purposes in Use of ICT According to Gender

This section investigates the opinions of mechanical engineering students on information and communication technologies usage for educational purposes according to gender.

Table 20. Student's opinions of use ICT according to gender

	Gender	N	Mean	Std. Deviation
B1	Female	25	3,40	0,91
	Male	76	3,32	0,87
B2	Female	25	3,92	0,76
	Male	76	4,01	0,72
B3	Female	25	3,88	0,97
	Male	76	3,86	0,74
B4	Female	25	3,44	1,00
	Male	75	3,39	1,13
B5	Female	25	4,68	0,80
	Male	76	4,38	1,03
B6	Female	25	2,68	1,11
	Male	76	2,71	1,11
B7	Female	25	3,36	0,95
	Male	76	3,30	1,08
B8	Female	25	4,32	0,63
	Male	76	4,11	0,70
B9	Female	25	4,28	0,74
	Male	76	4,21	0,64

Table 20. Student's opinions of use ICT according to gender (Continued)

	Gender	N	Mean	Std. Deviation
B10	Female	25	3,24	1,16
	Male	76	3,12	1,18
B11	Female	25	4,28	0,94
	Male	76	4,28	0,93
B12	Female	25	4,36	0,57
	Male	76	4,26	0,91
B13	Female	25	4,16	1,31
	Male	76	4,45	0,78
B14	Female	25	4,32	1,07
	Male	76	4,37	1,07
B15	Female	25	3,92	0,81
	Male	76	3,97	0,94
B16	Female	25	2,72	1,17
	Male	74	2,74	1,01
B17	Female	25	3,12	1,42
	Male	75	2,92	1,27
B18	Female	25	3,04	1,06
	Male	71	2,72	1,12
B19	Female	25	2,48	1,12
	Male	73	2,75	1,37
B20	Female	25	2,84	1,31
	Male	73	3,07	1,22
B21	Female	25	2,40	1,29
	Male	73	2,49	1,17
B22	Female	24	1,71	0,10
	Male	71	1,73	1,23
B23	Female	25	3,56	0,87
	Male	74	3,30	1,09
B24	Female	25	2,08	1,04
	Male	73	2,03	0,96

Table 20 explains student's view of point about ICT usage according to gender for questionnaire section 2. As Table 20 indicates that there is no significant different between male and female opinions in using information and communication technologies and there are in the same thought.

Table 21. Student's opinions of use ICT according to gender

	Gender	N	Mean	Std. Deviation
C1	Female	25	2,64	1,19
	Male	73	2,93	1,22
C2	Female	25	2,56	1,19
	Male	73	2,92	1,26
C3	Female	25	3,80	1,22
	Male	72	3,42	1,42
C4	Female	25	1,96	1,21
	Male	73	2,04	1,20
C5	Female	25	2,48	0,82
	Male	71	2,86	1,20
C6	Female	25	3,68	0,80
	Male	72	3,70	0,90
C7	Female	25	3,92	0,86
	Male	72	3,67	0,90
C8	Female	25	3,52	0,92
	Male	72	3,54	0,96
C9	Female	25	3,76	1,13
	Male	72	3,65	0,91
C10	Female	25	3,60	1,00
	Male	71	3,75	0,86
C11	Female	25	3,28	1,17
	Male	72	3,06	1,12
C12	Female	25	3,20	1,00
	Male	72	3,13	1,05
C13	Female	25	2,64	1,15
	Male	72	2,75	1,12
C14	Female	25	3,64	1,38
	Male	72	3,92	1,07

Table 21 explains opinions of students about use of ICT according to gender for last section of questionnaire. As Table 21 shows there is no main different between male and female opinions in using information and communication technologies.

4.2.2. Mechanical Engineering Student's Opinions on Educational Use of ICT According to Educational Background

This section investigated student's view of point in the associate of student's high school graduate background and using information and communication technologies.

Table 22. Student's opinion according to educational background

	Type of high school background	N	Mean	Std. Deviation
B1	Science High School	47	3,34	1,06
	Super high School	13	3,15	0,67
	Classical High School	20	3,55	0,89
	Other	21	3,24	0,62
	Total	101	3,37	0,87
B2	Science High School	47	3,87	0,71
	Super high School	13	4,23	0,93
	Classical High School	20	4,20	0,70
	Other	21	3,90	0,62
	Total	101	3,99	0,73
B3	Science High School	47	3,94	0,87
	Super high School	13	3,77	0,73
	Classical High School	20	4,00	0,65
	Other	21	3,62	0,80
	Total	101	3,86	0,80
B4	Science High School	47	3,17	1,17
	Super high School	13	3,08	1,04
	Classical High School	19	3,74	1,10
	Other	21	3,81	0,75
	Total	100	3,40	1,09
B5	Science High School	47	4,38	1,05
	Super high School	13	4,92	0,28
	Classical High School	20	4,25	1,11
	Other	21	4,52	0,93
	Total	101	4,46	0,99
B6	Science High School	47	2,85	1,29
	Super high School	13	2,77	0,93
	Classical High School	20	2,50	0,89
	Other	21	2,52	0,98
	Total	101	2,70	1,11

Table 22. Student's opinion according to educational background (Continued)

	Type of high school background	**N**	**Mean**	**Std. Deviation**
B7	Science High School	47	3,06	0,87
	Super high School	13	4,08	1,12
	Classical High School	20	3,55	1,36
	Other	21	3,19	0,81
	Total	101	3,32	1,05
B8	Science High School	47	4,02	0,68
	Super high School	13	4,38	0,65
	Classical High School	20	4,25	0,72
	Other	21	4,24	0,70
	Total	101	4,16	0,69
B9	Science High School	47	4,39	0,57
	Super high School	13	4,23	0,60
	Classical High School	20	4,10	0,79
	Other	21	4,00	0,70
	Total	101	4,23	0,66
B10	Science High School	47	3,09	1,18
	Super high School	13	2,54	1,27
	Classical High School	20	3,40	1,27
	Other	21	3,43	0,87
	Total	101	3,15	1,17
B11	Science High School	47	4,23	0,94
	Super high School	13	4,15	1,069
	Classical High School	20	4,35	0,81
	Other	21	4,38	0,97
	Total	101	4,28	0,93
B12	Science High School	47	4,38	0,71
	Super high School	13	4,00	1,08
	Classical High School	20	4,35	0,67
	Other	21	4,19	1,08
	Total	101	4,29	0,84
B13	Science High School	47	4,45	0,80
	Super high School	13	4,54	0,66
	Classical High School	20	4,45	0,94
	Other	21	4,05	1,28
	Total	101	4,38	0,94
B14	Science High School	47	4,36	1,15
	Super high School	13	4,46	1,17
	Classical High School	20	4,50	0,76
	Other	21	4,14	1,11
	Total	101	4,37	1,06

Table 22. Student's opinion according to educational background (Continued)

	Type of high school background	N	Mean	Std. Deviation
B15	Science High School	47	3,79	0,91
	Super high School	13	4,00	0,58
	Classical High School	20	4,35	0,67
	Other	21	3,95	1,16
	Total	101	3,96	0,90
B16	Science High School	47	2,47	0,91
	Super high School	13	3,54	0,66
	Classical High School	20	2,75	0,97
	Other	19	2,84	1,38
	Total	99	2,73	1,05
B17	Science High School	47	2,96	1,33
	Super high School	13	2,85	1,34
	Classical High School	20	3,20	1,36
	Other	20	2,85	1,23
	Total	100	2,97	1,31
B18	Science High School	46	2,72	1,15
	Super high School	13	3,87	0,90
	Classical High School	17	2,53	0,87
	Other	20	2,55	0,10
	Total	96	2,80	1,11
B19	Science High School	46	2,54	1,28
	Super high School	13	3,84	1,14
	Classical High School	19	2,73	1,33
	Other	20	2,20	1,11
	Total	98	2,68	1,31
B20	Science High School	46	3,04	1,25
	Super high School	13	3,70	0,95
	Classical High School	19	3,05	1,47
	Other	20	2,45	0,94
	Total	98	3,01	1,24
B21	Science High School	46	2,26	1,16
	Super high School	13	3,31	1,11
	Classical High School	19	2,47	1,22
	Other	20	2,40	1,14
	Total	98	2,47	1,19
B22	Science High School	43	1,53	0,98
	Super high School	13	2,69	1,75
	Classical High School	19	1,42	0,77
	Other	20	1,80	1,15
	Total	95	1,73	1,17

Table 22. Student's opinion according to educational background (Continued)

	Type of high school background	**N**	**Mean**	**Std. Deviation**
B23	Science High School	47	3,47	1,02
	Super high School	13	3,54	0,78
	Classical High School	19	3,21	0,85
	Other	20	3,15	1,39
	Total	99	3,36	1,04
B24	Science High School	47	1,91	0,88
	Super high School	13	2,23	0,93
	Classical High School	19	1,95	1,08
	Other	19	2,31	1,11
	Total	98	2,04	0,97

Table 22 explains difference between student's opinion in usage of information and communication technology according to educational background for questionnaire section 2. As Table 22 shows students who graduated from super high school and classical high school use computer and internet for project and lesson more than other schools. Also, all students from difference high school graduate who response the questionnaire connected internet with mobile phone. Super high school graduate students are more interested to use programs which are related to their profession but their ability is not enough to use computer for their profession in contrast with other schools. Generally whole of participation from different high background are agree that computer devices are require for their profession and English language is need for computer usage. Also, they all are in the same opinion to use email, search engines for working on project and entertainment. On the other hands students from super high school and classical high school use more internet for working on lesson and project.

Table 23. Student's opinion according to educational background

	Type of high school background	N	Mean	Std. Deviation
C1	Science High School	47	2,57	1,10
	Super high School	13	3,46	1,27
	Classical High School	19	3,21	0,92
	Other	19	2,79	1,51
	Total	98	2,86	1,20
C2	Science High School	47	2,81	1,09
	Super high School	13	3,85	0,99
	Classical High School	19	2,79	1,27
	Other	19	2,21	1,36
	Total	98	2,83	1,24
C3	Science High School	46	3,11	1,32
	Super high School	13	4,54	0,66
	Classical High School	19	4,37	1,12
	Other	19	2,94	1,40
	Total	97	3,51	1,38
C4	Science High School	47	1,90	1,18
	Super high School	13	1,77	1,09
	Classical High School	19	2,21	1,29
	Other	19	2,31	1,25
	Total	98	2,02	1,19
C5	Science High School	45	2,56	0,92
	Super high School	13	3,46	1,27
	Classical High School	19	2,47	0,96
	Other	19	3,05	1,39
	Total	96	2,76	1,12
C6	Science High School	46	3,71	0,54
	Super high School	13	4,08	0,86
	Classical High School	19	3,53	0,90
	Other	19	3,53	1,35
	Total	97	3,69	0,87
C7	Science High School	46	3,71	0,78
	Super high School	13	3,62	1,26
	Classical High School	19	3,79	0,79
	Other	19	3,79	1,03
	Total	97	3,73	0,90
C8	Science High School	46	3,52	0,62
	Super high School	13	3,46	1,39
	Classical High School	19	3,42	1,07
	Other	19	3,73	1,15
	Total	97	3,54	0,95

Table 23. Student's opinion according to educational background (Continued)

	Type of high school background	N	Mean	Std. Deviation
C9	Science High School	46	3,83	0,71
	Super high School	13	3,92	0,95
	Classical High School	19	3,47	1,26
	Other	19	3,37	1,12
	Total	97	3,68	0,96
C10	Science High School	46	3,78	0,63
	Super high School	12	4,00	0,85
	Classical High School	19	3,63	1,07
	Other	19	3,42	1,22
	Total	96	3,70	0,90
C11	Science High School	46	3,02	1,06
	Super high School	13	3,23	1,42
	Classical High School	19	3,21	1,18
	Other	19	3,16	1,12
	Total	97	3,11	1,14
C12	Science High School	46	2,87	0,93
	Super high School	13	3,23	1,01
	Classical High School	19	3,37	1,12
	Other	19	3,53	1,07
	Total	97	3,14	1,03
C13	Science High School	46	2,67	1,09
	Super high School	13	3,15	1,14
	Classical High School	19	2,63	1,30
	Other	19	2,63	1,01
	Total	97	2,72	1,12
C14	Science High School	46	3,65	1,16
	Super high School	13	4,16	1,21
	Classical High School	19	3,84	1,21
	Other	19	4,11	1,05
	Total	97	3,85	1,16

Table 23 explains difference between student's opinion in usage of information and communication technology according to educational background for questionnaire section 3. Students from super high school and classical high school agree that department have computer program obligatory by their profession. Also, students

from super high school accept as true more than others that university web pages are adequate announcements and communications services and supper high school students graduate are agree that presentation of course materials are adequate in the digital media also.

On the other hand students from classical high school use computer for entertainment more than others. All students from different schools use mobile phone to connect to internet. Supper schools graduated are interested more than others to use programs which are related to their profession. In believe that necessary of expressing a lesson through computer and need of computer for profession there are no different between graduate backgrounds.

Students who graduated from super high school and classical high school are agreeing that department have computer program required by their profession. Furthermore, in compare of super high school and other schools students with other students in believing that professional software teaching will be useful for their professional life; super high school and other schools students are more agree. As general, supper high school graduate students in response to questionnaire are interested to use information and communication technology.

Table 24. Difference between students education background

		Sum of Squares	df	Mean Square	F	p	Difference
B1	Between Groups	1,55	3	0,5	0,67	0,57	
	Within Groups	75,00	97	0,77			
	Total	76,55	100				
B2	Between Groups	2,44	3	0,81	1,56	0,20	
	Within Groups	50,55	97	0,52			
	Total	52,99	100				
B3	Between Groups	1,99	3	0,66	1,04	0,38	
	Within Groups	62,07	97	0,64			
	Total	64,06	100				
B4	Between Groups	9,52	3	3,17	2,81	**0,04**	Other – Science High School (0.06)
	Within Groups	108,48	96	1,13			
	Total	118,00	99				
B5	Between Groups	4,03	3	1,34	1,40	0,25	
	Within Groups	93,02	97	0,96			
	Total	97,05	100				
B6	Between Groups	2,59	3	0,86	0,69	0,56	
	Within Groups	120,50	97	1,24			
	Total	123,09	100				
B7	Between Groups	11,94	3	3,98	3,94	**0,01**	Super high School-Science High School, Super high School- other
	Within Groups	97,92	97	1,01			
	Total	109,86	100				
B8	Between Groups	1,85	3	0,62	1,31	0,27	
	Within Groups	45,61	97	0,47			
	Total	47,46	100				
B9	Between Groups	2,55	3	0,85	1,99	0,12	
	Within Groups	41,21	97	0,42			
	Total	43,76	100				
B10	Between Groups	7,94	3	2,65	1,99	0,12	
	Within Groups	128,83	97	1,33			
	Total	136,77	100				

Table 24. Difference between students education background (Continued)

		Sum of Squares	df	Mean Square	F	p	Difference
B11	Between Groups	0,617	3	0,21	0,23	0,87	
	Within Groups	85,62	97	0,88			
	Total	86,24	100				
B12	Between Groups	1,78	3	0,59	0,83	0,48	
	Within Groups	68,89	97	0,71			
	Total	70,67	100				
B13	Between Groups	2,95	3	0,98	1,13	0,34	
	Within Groups	84,75	97	0,87			
	Total	87,70	100				
B14	Between Groups	1,51	3	0,50	0,44	0,73	
	Within Groups	111,65	97	1,15			
	Total	113,17	100				
B15	Between Groups	4,48	3	1,49	1,87	0,14	
	Within Groups	77,37	97	0,80			
	Total	81,84	100				
B16	Between Groups	11,96	3	3,99	3,98	**0,01**	Super high School - Science High School, Classical High School- Super high School
	Within Groups	95,21	95	1,00			
	Total	107,17	98				
B17	Between Groups	1,55	3	0,52	0,30	0,83	
	Within Groups	167,36	96	1,74			
	Total	168,91	99				
B18	Between Groups	17,04	3	5,68	5,21	**0,00**	Super high School- Science High School, Super high School- Classical High School and other
	Within Groups	100,20	92	1,09			
	Total	117,24	95				

Table 24. Difference between students education background (Continued)

		Sum of Squares	**df**	**Mean Square**	**F**	**p**	**Difference**
B19	Between Groups	23,20	3	7,73	5,05	**0,00**	Super high School- Science High School, Super high School- Classical High School, other
	Within Groups	143,99	94	1,53			
	Total	167,19	97				
B20	Between Groups	12,41	3	4,13	2,85	**0,04**	Other-Super high School
	Within Groups	136,58	94	1,45			
	Total	148,99	97				
B21	Between Groups	11,23	3	3,74	2,7	**0,05**	Super high School- Science High School, Super High School-Classical High School, Super high School- Other
	Within Groups	127,17	94	1,35			
	Total	138,41	97				
B22	Between Groups	15,59	3	5,19	4,17	**0,00**	Super high School- Science High School, Super High School-Classical High School, Super high School- Other
	Within Groups	113,30	91	1,24			
	Total	128,88	94				
B23	Between Groups	2,27	3	0,76	0,69	0,56	
	Within Groups	104,64	95	1,10			
	Total	106,91	98				
B24	Between Groups	2,82	3	0,94	0,99	0,40	
	Within Groups	89,02	94	0,95			
	Total	91,84	97				

Table 24 displays the different view between students with several of educational background for second section of questionnaire. High school educational background can influence students' opinions toward the use of technology. The aims of this investigation are to discover if students in a difference of educational institutions varied in their views to discover more about information and communication technology activities and knowledge. The participants who response the questionnaire are the graduate from science high school, super high school, classical high school and another high school.

As indicated in Table 24 there is different thought between students from other schools and science high school graduate are in different attitudes in response to question B4 in seeing themselves adequate about using computers and information technology. Students who graduate from super high school have different attitudes with student from science high school and other schools for using programs which are associated to their profession. Furthermore, there is different student's opinion of meet their requirements on the internet between super high school graduate students with science high school graduate students and in the same way classical high school students graduate have different attitudes with supper high school in response the same question.

In answer to question B18 students who graduate from super high school have different opinion with students who graduate from science high school, classical high school and other toward usage of computer for communication and lesson and project. Also, students who graduate from other schools think different with supper high schools students in usage computer for fun. In response to question B21 and B22 in relation to students' opinion in seeing themselves sufficient on use of

computer and information technology, and connected to the internet with mobile phone, the opinion of students from super high school graduate with science high school, classical high school and other are different.

Table 25. Difference between students education

		Sum of Squares	df	Mean Square	F	p	Difference
C1	Between Groups	10,96	3	3,65	2,62	0,05	
	Within Groups	131,04	94	1,39			
	Total	142,00	97				
C2	Between Groups	20,77	3	6,92	5,03	**0,00**	Super high School- Science High School, Classical High School- Super high School, Other- Super high school
	Within Groups	129,28	94	1,37			
	Total	150,05	97				
C3	Between Groups	41,17	3	13,72	9,04	**0,00**	Science High School- super high school, other- super high school, Science High School- classical high school, other- classical high school
	Within Groups	141,06	93	1,52			
	Total	182,23	96				
C4	Between Groups	3,92	3	1,31	0,91	0,43	
	Within Groups	134,04	94	1,42			
	Total	137,96	97				
C5	Between Groups	11,46	3	3,82	3,25	**0,02**	Super high school- science high school, classical high school- super high school
	Within Groups	108,03	92	1,17			
	Total	119,49	95				

Table 25. Difference between students education background (Continued)

		Sum of Squares	df	Mean Square	F	p	Difference
C6	Between Groups	2,99	3	1,00	1,33	0,27	
	Within Groups	69,72	93	0,75			
	Total	72,72	96				
C7	Between Groups	0,31	3	0,10	0,13	0,94	
	Within Groups	76,72	93	0,82			
	Total	77,03	96				
C8	Between Groups	1,09	3	0,37	0,40	0,75	
	Within Groups	85,02	93	0,91			
	Total	86,12	96				
C9	Between Groups	4,40	3	1,47	1,61	0,19	
	Within Groups	84,69	93	0,91			
	Total	89,09	96				
C10	Between Groups	2,95	3	0,98	1,24	0,30	
	Within Groups	72,88	92	0,79			
	Total	75,83	95				
C11	Between Groups	0,78	3	0,26	0,19	0,90	
	Within Groups	122,97	93	1,32			
	Total	123,75	96				
C12	Between Groups	7,29	3	2,43	2,39	0,07	
	Within Groups	94,68	93	1,02			
	Total	101,98	96				
C13	Between Groups	2,84	3	0,95	0,74	0,53	
	Within Groups	118,64	93	1,28			
	Total	121,48	96				
C14	Between Groups	4,24	3	1,41	1,05	0,37	
	Within Groups	124,44	93	1,34			
	Total	128,68	96				

Table 25 explains the different opinion between students with several of high school background for last section of questionnaire. This table analysis shows that students in a variation of educational institutions will be different in their opinion to realize more about information and communication technology activities and knowledge.

As Table 25 indicates students who graduate from super high school have different attitudes with students who graduate from science high school, classical high school and other on the way to meet of hardware of department computers with their requirements.

Furthermore, in response to question C3 in relation to students' view about; department have computer programs required by their profession, students from several high school have different view as fallow: science high school with super high school, other with super high school, science high school with classical high school, and other with classical high school. Also, students who graduate from super high school have different attitude with students from science high school and classical high school toward usage of faculty computers and information technology tools for communication and entertainment purposes.

Tables 24 and 25 generally show that opinion of students who graduate of super high school students are different with science high school, classical high school and other high school graduate.

Chapter 5

CONCLUSION

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.

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. 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.

REFERENCES

Alazam, A., Bakar, A. R., Hamzah, R., and Asmiran, S. (2012). Teachers' ICT Skills and ICT Integration in the Classroom: The Case of Vocational and Technical Teachers in Malaysia, *Creative Education*, 3, 70-76.

Ali, E. A. (2014). ICT in engineering educational content delivery: Challenges and opportunities, Science Proceedings (World Congress on Engineering Education 2013), http://dx.doi.org/10.5339/qproc.2014.wcee2013.4

Ali, R., Abu-Hassan, N. and Jusoff, K. (2010). Information literacy skills of engineering students, *IJRRAS*, 5 (3), pp. 331-339.

Babbie, Earl R., Belmont, CA. and Wadsworth Cengage, (2010). Muijs, Daniel, *The Practice of Social Research*:. Doing Quantitative Research in Education with SPSS. 2nd edition. London: SAGE Publications.

Bakare, O. (2014). The Role of Information and Communication Technology in Education: Case of Eastern Mediterranean University, MSc Thesis, Eastern Mediterranean University.

Bhattacharya, B. (2008). Engineering education in India – the role of ICT, *Innovations in Education and Teaching International*, 45(2), pp. 93–101.

Egoeze, F., Kwano, G., Misra, S. and Akman, I., Colomo-Palacios, R. (2014). An evaluation of ICT infrastructure and application in Nigeria universities, *Acta Polytechnica Hungarica*, 11(9), 115 –124.

Eid, M. I. M. and Al-Jabri , I. M. (2016). Social networking, knowledge sharing, and student learning: the case of university students, *Computers & Education*, 99, 14–27.

Fan, T.S. and Li, Y.C. (2005). Gender issues and computers: college computer science education in Taiwan, *Computers & Education*, 44, 285-300.

Felder. R.M. and Silverman, L.K. (1988). Learning and Teaching Styles in Engineering Education, *Engr. Education*, 78(7), 674-681.

Feldmann, L. and Feldmann, J. (2002). Developing information literacy skills in freshmen engineering technology students, Frontiers in Education Conference, 30th Annual.

González, A. B. and Rodríguez, M-J., Olmos, S., Borham, M., García, F. (2013). Experimental evaluation of the impact of b-learning methodologies on engineering students in Spain, *Computers in Human Behavior*, 29(2), 370-377.

Han, I. and Shin, W. S. (2016). The use of a mobile learning management system and academic achievement of online students, *Computers & Education*, 102, 79-89.

Henderson, S., Broadbridge, P. (2007). Mathematics for 21st Century Engineering Students, Proceedings of the 2007 AAEE Conference, Melbourne.

Jou, M., Tennyson, R. D., Wang, J. and Huang, S. Y. (2016). A study on the usability of E-books and APP in engineering courses: a case study on mechanical drawing, *Computers & Education*, 92–93, 181–193.

Kabouridis, G. (2004). An Assessment of ICT-based Education for Mechanical Engineering in TEI Patras, Greece, Proceedings of the 6th International Conference on Networked Learning, pp. 829-835.

Kabouridis, G. (2010). An innovative approach to face the first-year mechanical engineering students' conceptual difficulties in engineering design, 1st WIETE Annual Conference on Engineering and Technology Education, 2010 WIETE, Pattaya, Thailand, 22-25February.

Kaffash, H. R., Abedi Kargiban, Z., Abedi Kargiban, S. and Talesh Ramezani, V. (2010). A close looks in to role of ICT in education, *International Journal of Instruction*, 3 (2), pp. 165-173.

Kent, N. and Facerw, K. (2004). Different worlds? A comparison of young people's home and school ICT use, *Journal of Computer Assisted Learning*, 20, pp. 440–455.

Kiss, G. and Kalagiakos, P. (2012). A comparison of the mechanical engineering and technical manager student's lCT attitudes at the Obuda University, Institute

of Machine Design and Safety Engineering Obuda University Budapest, Hungary.

Kiss, S. and Szasz, A. (2016). A comparison of the mechanical engineering and safety engineering student's ICT attitudes at the Obuda University, SHS Web of Conference, 26, 01094, 2016.

Kuhlemeier, H. and Hemker B. (2007). The impact of computer use at home on students' Internet skills, *Computers & Education*, 49, 460–480.

Kumar, R. and Kaur, A. (2005). Internet and its use in the engineering colleges of Punjab, India: a case study, *Webology*, 2, 21-25.

Levin, T. and Wadmany, R. (2006). Teachers' Beliefs and Practices in Technology-based Classrooms: A Developmental View, *Journal of Research on Technology in Education*, 39(2), 157–181.

Livingstone, S. (2012). Critical reflections on the benefits of ICT in education, *Oxford Review of Education*, 38 (1), pp. 9–24.

Lorencowicz, E., Kocira, S., Uziak, J. and Tarasinska, J. (2014). Application of ICT by students at selected universities in Poland, Tojet, *The Turkish Online Journal of Educational Technology*, 13(4), 142-151.

Lu, Z. Hou, L. and Huang, X. (2010). A research on a student-centred teaching model in an ICT-based English audio-video speaking class, *International Journal of Education and Development using ICT*, 6(3), pp. 101-123.

Lucke, T., Dunn, P.K. and Christie, M. (2016). Activating learning in engineering education using ICT and the concept of flipping the classroom, *European Journal of Engineering Education*, pp. 1-13.

Lyle, D., Feisel, Albert, J. and Rosa. (2005). The Role of the Laboratory in Undergraduate Engineering Education, *The Research Journal for Engineering Education*, 94(1), pp. 121-130.

McFarlane, A. and Sakellariou, S. (2002). The Role of ICT in Science Education, *Cambridge Journal of Education*, 32(2), pp. 16-22.

Michael, F., Christie , A. J. and Jonsson, L. E. (2002). Evaluating the use of ICT in engineering education, *European Journal of Engineering Education*, 27(1), 13-20.

Mohamed Abdullah, A. and Gulzar, Z. (2016). The Role of ICT for Improving Engineering Education in India: Challenges and Opportunities, *International Journal of Advance Research in Computer Science and Management Studies*, 4 (3), pp. 412-419.

Mueller, S. (2004). Electronic mentoring as an example for the use of information and communications technology in engineering education, *European Journal of Engineering Education*, 29(1), 134-139.

Ogur, E. O. and Ogola, W. O. (2013). The Role of Computer Technology in Mechanical Engineering Education in Kenyan Universities, The *International Journal Of Engineering And Science (IJES)*, 2(11), pp. 77-81.

Oladiran, M. and Uziak, J. (2009). Assessment of ICT- based course delivery for mechanical engineering students - a case study, Department of Mechanical Engineering University of Botswana.

Palmer, S. (2000). On- and off-campus computer usage in engineering education, *Computers & Education*, 34, 141-154.

Pascual, R. and Uribe, R. (2006). Experiential Learning Strategies in a Mechanical Engineering Senior Course, Mechanical Engineering Department, Universidad de Chile, Santiago, Chile.

Richard, Felder, Donald, Wood, James and Rudarcia, (2000). The Future of Engineering Education, *Journal of Engineering Education*, 34(1), pp. 26–39.

Sandelowski M. (2000). Focus on Research Methods Whatever Happened to Qualitative Description, *Research in Nursing & Health*, 2000, 23, 334-340.

Seppälä, P., Sariola, J. and Kynäslahti, H. (2002). Mobile Learning in Personnel Training of University Instructors, Proceedings of the IEEE International Workshop on Wireless and Mobile Technologies in Education (WMTE'02), 2002.

Smith, P.R. (1976). Computers in engineering education in the United Kingdom, *Computers & Education*, 1(1), 13-21.

Su, K.-D. (2008). An integrated science course designed with information communication technologies to enhance university students' learning performance, *Computers & Education*, 51, 1365–374.

Tansu Hocanın, F. and Iscioglu, E. (2014). Use of mobile tablets in the learning environment: perspective of the computer teacher candidates, *Journal of educational and instructional studies in the world*, 4(2), 2146-7463.

Triantafyllou, E. (2015). ICT-Based teaching methods for improving mathematics learning for media technology students investigation and findings, Faculty of Engineering and Science, Aalborg University, PHD thesis.

Trujillo, F. J., Martín, M. J., Martín, F. and Sevilla, L. (2016). Design, development and implantation of self-assessment tools in the subject of manufacturing engineering in engineering degrees, *Materials Science Forum*, 853, 24-29.

Lewis and Williams, (1994). Best Practices in Experiential Learning, *the learning and teaching office*, p. 4.

Yaman, G, Yaman, R., Istanbullu, A. and Gürüler, H. (2015). Evaluation of Information and Communication Technology Usage for Engineering Students, *Mugla Journal of Science and Technology*, V. 1(1), pp. 39-44.

Zydney, J. M. and Warner, Z. (2016). Mobile apps for science learning: review of research, *Computers & Education*, 94, pp. 1-17.

APPENDIX

Appendix: Questionnaire

Usage of Computer and Communication Opportunity Assessment Questionnaire

To mark up the option of matching to you in questions will increase the accuracy assessment. Thank you for taking the time by participating in the questionnaire, information and results of questionnaire will be used for academic purposes only.

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1. Section:

Gender: □F □M Age: ……

Department: Mechanical Eng. □ Other

Type of Graduated High School: Science High School □Anatolian High School □ Super High School □ Classical High School □

Others……. □

A1. Do you have a personal computer?

(If the answer is 'Yes', continue with the 'A2' coded question; otherwise continue with 'A3' coded question) □Yes □ No

A2. What sort of computer do you have?

(You can mark more than one option)

Desktop □Notebook □Netbook □PDA

A3. How do you make up your computing needs most if you do not have a computer?

Friend(s) □Internet café □ Faculty □ other…….

A4. What is the most objective to use most computers of faculty?

Lesson / project Communication Entertainment □ No, I do not use

A5. How many hours do you use a computer in a day?

□7 or more □4-7 □2-4 □ 0-2

In the following questions, please mark your answers by putting a tick (✓) in the box that corresponds to the extent you agree or disagree with each proposal.

	Issues concerning ICT	always	usually	sometimes	seldom	never
B.1	I’m using the computer for communication.	❑1	❑2	❑3	❑4	❑5
B.2	I'm using the computer for courses and projects	❑1	❑2	❑3	❑4	❑5
B.3	I'm using the computer for entertainment purposes	❑1	❑2	❑3	❑4	❑5
B.4	I see myself sufficient about using computers and information technologies	❑1	❑2	❑3	❑4	❑5
B.5	I connect to the internet with my mobile phone	❑1	❑2	❑3	❑4	❑5
B.6	I use computers of faculty	❑1	❑2	❑3	❑4	❑5
B.7	I’m using programs which are related to my profession.	❑1	❑2	❑3	❑4	❑5
B.8	I think expressing a lesson through computer is necessary	❑1	❑2	❑3	❑4	❑5
B.9	The computer usage is a requirement for my profession	❑1	❑2	❑3	❑4	❑5
B.10	My ability to use computer is enough for my profession	❑1	❑2	❑3	❑4	❑5
B.11	English language is necessary for computer usage	❑1	❑2	❑3	❑4	❑5
B.12	I use my e-mail	❑1	❑2	❑3	❑4	❑5
B.13	I use search engines (Google and similar) tools for courses / projects	❑1	❑2	❑3	❑4	❑5
B.14	I use search engines (Google and similar) tools for entertainment	❑1	❑2	❑3	❑4	❑5
B.15	I use the internet for my projects and lessons	❑1	❑2	❑3	❑4	❑5
B.16	I meet my needs (shopping) on the internet	❑1	❑2	❑3	❑4	❑5
B.17	I carry out my banking transactions on internet	❑1	❑2	❑3	❑4	❑5
B.18	I use the computer for communication	❑1	❑2	❑3	❑4	❑5
B.19	I use the computer for lessons and projects.	❑1	❑2	❑3	❑4	❑5
B.20	I use the computer for entertainment.	❑1	❑2	❑3	❑4	❑5
B.21	I'm seeing myself not enough about computer usage and information technologies?	❑1	❑2	❑3	❑4	❑5
B.22	I do not connect to the internet with my mobile phone.	❑1	❑2	❑3	❑4	❑5
B.23	I do not use computers much at faculty.	❑1	❑2	❑3	❑4	❑5
B.24	I do not use internet much in my projects and lessons.	❑1	❑2	❑3	❑4	❑5

	Issues concerning ICT	always	usually	sometimes	seldom	never
C.1	I think the number of computers is sufficient in department	❑1	❑2	❑3	❑4	❑5
C.2	The hardware of department computers meet my needs	❑1	❑2	❑3	❑4	❑5
C.3	Department has computer programs required by my profession	❑1	❑2	❑3	❑4	❑5
C.4	I use faculty computers and information technology tools for communication and entertainment	❑1	❑2	❑3	❑4	❑5
C.5	I use faculty computers and information technology tools for homework/ projects purposes	❑1	❑2	❑3	❑4	❑5
C.6	University web pages, announcements and communications services are adequate	❑1	❑2	❑3	❑4	❑5
C.7	Faculty web pages, announcements and communications services are adequate	❑1	❑2	❑3	❑4	❑5
C.8	Department web pages and other information and communication services are adequate	❑1	❑2	❑3	❑4	❑5
C.9	Faculty members' web pages and other information and communication services are adequate	❑1	❑2	❑3	❑4	❑5
C.10	Presentations of course materials in the digital media are adequate	❑1	❑2	❑3	❑4	❑5
C.11	The professional software is offered by academician present and use in my department	❑1	❑2	❑3	❑4	❑5
C.12	I efficiently use the professional software about my department	❑1	❑2	❑3	❑4	❑5
C.13	I provide professional software need in my department when I need	❑1	❑2	❑3	❑4	❑5
C.14	The professional software teachings be useful to me in my professional life	❑1	❑2	❑3	❑4	❑5