



አዳማ ሳይንስ እና ቴክኖሎጂ ዩኒቨርሲቲ
Adama Science & Technology University

***School of Electrical Engineering and Computing
(SoEEC)***

***Department of Computer Science and
Engineering(CSE)***

Filling the gender gap in teaching and learning via ICT

(case of Adama Science and Technology University)

By:

Genet Shanko and Getinet Yilma

Email: gdekebo2020@gmail.com

Mobile: 0911-366577

July, 2017

ASTU

ABSTRACT

The recent development of ICTs has brought many changes in different sectors. In higher learning Institution, there are number positive changes. ICT have brought efficiency, effectiveness, and efficiency in the provision of the core function namely teaching and learning, research and consultancy. Previous work showed that even though there is an improvement in promoting female students using affirmative action there is still high attrition rate in higher institution comparing to male students. So, the concern of this research is to insight the factors that affects teaching and learning when using ICT as a tool and identify some the components that must be considered during the development of the tools for promoting female students in engineering and science discipline. Consequently, in the literature, the study investigate the challenge that affect female students in engineering and science. As a methodology, the study used mixed methodology both qualitative and quantitative data collection method. As a result, the study identified factors that influences female students to accept and use of ICT as a tools such as the competency, self-efficiency, and quality of internet connection facilitated condition, and self-management, self-influence, and perceived usefulness. Consequently, this study evaluate the contribution of ICT to promote the participation of female students in science and engineering discipline in Ethiopia higher institution specifically in ASTU. Finally, the result explain the potential benefit of ICT as a tools for female student's participation in engineering and science discipline and it insight to explore the adoption and use of ICT for teaching and learning. Furthermore, this calls different stockholders to consider those factors and identified components when fully implement and mainstream ICT as a tool for teaching and learning to make it a reality and myth in promoting female students participate in science and engineering.

Keywords: higher institution, ICT, female students, teaching and learning, ICT as a tools.

Table of content

1. Introduction.....	5
1.1. Problem statement.....	6
1.2. Objective.....	6
1.3. Research question.....	7
1.4. Significance of the Research.....	7
1.5. Scope of the project.....	8
2. Background.....	8
2.1. Attrition rate at ASTU.....	8
2.2. Use of ICT for learning in ASTU.....	8
2.3. ASTU E-learning center.....	9
3. Literature review.....	9
3.1. Basic concept of ICT.....	10
3.2. Existing ICT initiatives for education.....	10
3.3. Summary of research gaps and analysis.....	11
4. Methodology.....	14
4.1. Data collection.....	15
4.1.1. Survey questioner.....	16
4.1.2. Baseline survey results.....	16
4.2. Analysis, result, and discussion.....	16
4.3. Result from qualitative data and analysis.....	19
4.3.1. Challenge of female students in engineering and science.....	20
4.3.1.1. Classroom and academic climate—teaching and advising.....	20
4.3.1.2. Classroom and academic climate— individualistic culture.....	20
4.3.1.3. Grades and conceptual understanding.....	21
4.3.1.4. Self-efficacy and self-confidence.....	21
4.4. An integrated copmntnts as a model for development and use of ICT as a learning tool	
22	
5. Conclusion.....	25
6. Reference.....	26
7. Apendex.....	25C:\Users\ISE-
LAB\Desktop\Aberash\26 - _Toc489258786	

1. Introduction

Issue of gender inequality in engineering and science has been under discussion for many years. A large number of female students leave engineering and science department per year. To increase retention rate in engineering and science program, the reason why students leave engineering program was determined by different scholar for a decade (David, 2015). Many scholar suggest different solution for the problem, however, the participation of female students in engineering and science is relatively very low in Ethiopia. The level of participation in some aspect increased but still the attrition rate not improved (Geisinger& Raman, 2013). Despite ongoing concern on the subject, the engineering field's remains heavily male-dominant (Lagoudas, 2009). A female student has long reported to have less representation than men in the field of engineering and science (Kokkelenberg & Sinha, 2010).

At the same time, in the literature, a common set of factors that contribute to attrition rates of female students in engineering and science programs was recognized. These factors include the unwelcoming academic climate found in many engineering programs, conceptual difficulties with core courses, a lack of self-efficacy or self-confidence, inadequate high school preparation, insufficient interest-in or commitment to the field of engineering and a change in career goals (Geisinger and Raman, 2013).

Despite of the fact that, the contribution of ICT for different sector including teaching and learning few research suggest to emphasise the application of ICT in improving gender specific problem in higher institution (Khan, Hasan & Clement, 2012). Previous research not well addressed the way that ICT can promotes the participation of female students in engineering and science discipline (Sanga et al., 2013). Therefore, this study intend to provide insight the factors that affects in adopting and use ICT as a tool and to specifically indicate the components that must be considered during the development of ICT application to improve the participation of female students in engineering and science. Consequently, this study proposes some components that must be considered as part of the development tools integrating as a model that shows the way ICT can be developed and used to increase the participation of female students in engineering and science.

Therefore, the finding of this study will be useful to policymaker, academic communities and other stockholders dealing with the development, adoption, and use of ICT as a tool for teaching

and learning. At the same time, it is a call need for developing ICT based teaching and learning tools based on the developed model component by this study, to improve the participation of female students in engineering and science subjects in order to fully contribute in the current challenge facing Ethiopia.

1.1. Problem statement

Apparently, participation of female students in engineering and science is relatively very low in Ethiopia (Griffith, 2010). The levels of participation in some aspects of all discipline of higher institution, particularly science and engineering, have not increased to the same extent as overall levels of entry to higher education (Morley et al. 2007). Science and engineering discipline have been identified as having exceptionally higher attrition rates across Ethiopian higher institution. As identified science and engineering disciplines as having the largest attrition rate of identified fields of study with approximately one-third of students leaving.

Researchers agree that female students attrition from tertiary educational institutions is expensive and wasteful (Bailey & Borooah, 2007; Johnes & McNabb, 2004; McMillan, 2005; Tinto, 1993; Yorke, 1998).

Consequently most scholar suggest differ solution to improve the attrition rate of female students in higher institution such as: applying affirmative action, giving tutorial class for female students separately , preparing separate library ,during department choice performing open discussion with them in order to clear the cloud and the way to overcome the hardship , sharing experience with senior students and graduate students to develop their confidence and skills, and awarding for high achieving female students(Bekele et.al, 2011; Ost , 2010; Sanga et al., 2013). However, the retention rate of female student not improved as it is expected. Thus government should give an emphasis on the way to improve the participation of female students regarding engineering and science. Therefore, this study aims in advancing the trend of participation of female students with improving the quality of education system of the countries in Ethiopia need to develop ICT as a tool for teaching and learning tools in delivering education services at the same time study explore the current trend and factors that may affect female students adoption and use of ICT for learning.

1.2. Objective

The overall objective of the study will be to explore the way the development, adoption, and use of ICT as a tool in promoting participation of female students in engineering and science in Ethiopia, especially in Adama Science and Technology University.

Specifically the study aims:

- To examine current status of ICT usage by students in ASTU.
- To identify the current challenge that affect female students in using ICT as a tools for learning in engineering and science.
- To develop as a model by integrating some components that must be considered to develop and use ICT as a tool during the development and integration of ICT for teaching and learning, particularly on the benefits and degree of participation of female students in science and engineering disciplines at higher institutions.

1.3. Research question

To propose the way of female student’s participation improved in teaching and learning through development, adoption, and use of ICT as a tool for teaching and learning in higher institution the following research question are formulated:

- What is the current trend on the usage of ICT as a tool for teaching and learning in case of ASTU?
- What is the determinant factor that influences female student’s to adapt and use technology as learning tools in case of ASTU?
- How can different components be integrated as a model for the development and use of ICT as a tools for teaching and learning to improve the `participation of female students in engineering and science discipline?

1.4. Significance of the Research

Gender gap in education is currently the critical concern of educators, researchers, and policy makers, and it is one of the Sustainable Development Goal for the 16 goal seated in 2016 -2030. The concern extends well beyond the very important equity issue and induced deliberate move to improve the situation of female students with respect to participation in engineering and science discipline. The low education level of most female students leads them to less rewarding and lower status jobs-like the usual domestic activities performed at home. This, in turn, has a negative effect on how female students perceive themselves by reinforcing and continuing gender stereotypes and biases. As it has been usually range in these days, “Educating a female is educating the family” (WHO, 2013) enhancing female students’ participation in engineering and science at higher level institutions in realizes the poverty reduction process and the attainment

of other millennium development goals of the country (Ministry of education, 2014). Therefore, this research is believed to have salient contributions in uncovering the deep-rooted academic problems of female students and appropriating the way the use of ICT as a tool to improve the participation of female students in engineering and science. This enables the higher institution and other concerned bodies to take intervention measures to alleviate the problem and improve of the situation. Moreover, the research can serve as a resource for other researchers who wish to promote further research development in the area.

1.5. Scope of the project

Scope of the project includes the female student's that is found at university that can study engineering and science discipline. The study focus on how can use of ICT as a tool be improve the attrition rate of female students at university level. Furthermore, the study focus on female student that already entered in higher institution and attrition is taken as central problem for those student's. Furthermore, in this study, the term attrition is used to indicate the loss of female students from science and engineering courses getting failing grade in science and engineering courses. Additionally, this study focus on ICT for learning as to improve the attrition of female students ICT refers to" the computer and internet connections used to handle and communicate information for learning purpose" (Tinio, 2002).

2. Background

2.1. Attrition rate at ASTU

The attrition rate of female students in science and technology for the last six semester was described in (Appendix 1). As, indicated that the attrition rate of female students from 2004-2006 is decreasing from semester to semester this because of the measure taken by the university a kinds of giving separate tutorial class, female student's library and giving pocket money for those who have economic problem. However, still, the attrition rate of female students high when it is compared with male students by around 7% so this indicates that the university society should work more to improve. This study focus on the way the adoption and use of ICT as a tool to improve the promotion of female students in engineering and science discipline.

2.2. Use of ICT for learning in ASTU

In ASTU each building has its own wireless sensor including female student's dormitories. In addition to this, there is an ICT pool around the ICT center that is available 24hr /7 day for

students. Moreover each library, especially in the female student's library there is a computer that is available for students to use for access information.

Based on the survey questioner the study collected data from the student in different department about the usage of the computer in ASTU most students use personal and lab computer in the university the detail is indicated on the (Appendix 2).

ICT used by students for communication, study, access information, entertainment, participation online discussion and for research work. The survey found that students are well equipped to come into tertiary education with the computer, laptop, and access to a computer. There were 64% students who are from mixed subject area responded that they own a computer while other 21% would need to depend on the computers in university. There was still approximately, 8% student who did not have access, own or were finding it difficult to access a computer freely. Notably, the age of computer is also reflecting that most students use the new computers as 65% of female students had their ICT equipment between 1-3years old. The students have just the ICT time spent on campus as 57% for first 10 hours and 37% for the more than 10 hours. This gave the importance to the time spent on use of ICT as a tool for learning is a significantly higher leverage.

2.3. ASTU E-learning center

Adama science and technology university established e-learning center in October 15, 2009, with the goal of enabling departments in all schools of the University to apply e-learning in their teaching and learning process primarily in their regular programs and later proceeding to expand it to extension programs (Ketema & Nirmala,2015). ASU's e-learning center continue its e-learning technology. It is available for all teacher who are willing to use the system. The center so far has exerted its tireless efforts to promote e-Learning on various occasions to create wide range awareness about e-Learning in the minds of various stakeholders both in ASTU and outside (Ketema & Nirmala, 2015).

3. Literature review

This section focus on revising the basic concepts of ICT in education system, the existing ICT initiatives, current challenge of female students in science and engineering and Summary of the gap.

3.1. Basic concept of ICT

For developing countries, ICTs have the potential for increasing access and improving the relevance and quality of education. This represents a potentially equalizing strategy for developing countries.

ICT refers to the computer and internet connections used to handle and communicate information for learning purpose. This use of ICT greatly facilitate the acquisition and absorption of knowledge, offering in higher institution and the user provides unprecedented opportunities to enhance educational systems. ICT promise to reduce that sense of isolation, and to open access to knowledge in an unimaginable way.

Besides e-learning is one of the teaching and learning system which is defined as a learning program that makes use of an information network- such as the internet, an intranet (LAN) or extranet (WAN) whether wholly or in part, for course delivery, interaction and/or facilitation. Web-based learning is a subset of e learning and refers to learning using an internet browser such as the Moodle, Blackboard or internet explorer (Tinio, 2002). In this study, the term is specifically restricted to the use of interactive, Web-enabled course to facilitate teaching and learning (Masterman et al., 2009). Other educational processes include flexible communication, interaction, material storage and the general management of the course (Mlitwa, 2005).

Furthermore, the word ICT usage in this study is understood separately from adoption, but as something that can be part of adoption (Mlitwa, 2005). Whilst it may include both the acceptance and actual usage of the tool, the pilot research also suggests that technology is used, in some cases, not willingly, but under duress because of an institutional policy (Czerniewicz et al., 2007). Either with or without acceptance, the user follows specific procedures and routines in applying the tool to achieve specific goals and objectives.

3.2. Existing ICT initiatives for education

The use of different techniques for Education Implementation Strategy and its corresponding action plan are components of a wider Ethiopian national e-education initiative(Amere, 2011). This initiative forms one of the pillars of the ICT for development 2010 Plan. The strategy is built on the main streams that is ICTs in Higher Education Initiative: focuses on deploying ICTs within the universities and colleges. In higher education in particular application of ICTs in the form of e-learning is already changing teaching and learning processes (Sife et al. 2007). According to Fisser (2001) and Pelliccione (2001), there are many pedagogical and socio-economic factors that have driven higher learning institutions to adopt e-learning. These include greater information access, greater communication via electronic facilities, synchronous

learning, increased cooperation and collaboration, cost-effectiveness (by reaching different students in greater numbers) and pedagogical improvement through simulations, virtual experiences and graphic representations. The other ICT initiatives in Ethiopia are ICT Park, woreda net, and e-learning.

The Ethiopian government has launched an ICT park, becoming the second East African nation, after Kenya to do so. The ambitious project, known as Techno polis is being constructed in Addis Ababa. The establishment of the ICT Park is expected to attract overseas investment, generate foreign earnings, stimulate growth of domestic ICT industry and create employment and career opportunities for Ethiopian citizens (Africa CEO forum, 2012).

WoredaNet initiative is a major e-government initiative that connects Ethiopia's local councils "woreda" to the regional capitals through Internet telephone and video-conferencing. In addition, the initiative provides connectivity to SchoolNet, eHealth, and AgriNet. It is implemented by Ethiopia Telecommunication Agency with funding from the World Bank and African Development Bank through the Ministry of Capacity Building. Ethiopic Standards Development and Dissemination Program Development is a Government of Ethiopia and UNESCO-supported initiative that enables unrestricted and easy communication using modern computers and software for Ethiopia script users. The project has developed a standard keyboard layout and has provided standard terminology of computer words in Amharic www.eictda.gov.et/Standard.htm.

3.3. Summary of research gaps and analysis

As many scholar suggested the uses of ICT in education making major differences in the learning of students. Furthermore, the use of ICTs in education also shifts the learning approaches. As put by (Bransford, Brown, and Cocking, 1999) cited in Volman (2005), there is a common belief that the use of ICTs in education contributes to a more student's center learning and an increase in activity and greater responsibility of students. This limits the role of the teacher to supporting, advising, and coaching students rather than merely transmitting knowledge. By considering the advantage of ICT in education this study propose to identify the factor that affects use of ICT in learning for female students at engineering and science from the literature. The determine factors that influence the female student's not to participate to use of ICT for learning proposes in engineering and science identified are using extended Technology Acceptance Model (TAM). Some of the research that studied before using TAM are Belle 2006; Wu, Wang, and Lin 2007; Yi, Jackson, Park, and Probst 2006; Yu 2012; Wu, Li, and Fu 2011;

Cilliers and Flowerday 2013; Samhan, B., Dadgar, M. and Joshi 2013; Abouzahra, M and Tan J. 2013). Multiple studies have been conducted to investigate factors that affect adoption and use of ICT for teaching and learning services using teachers and students' Perspective's; but not in engineering and science institution.

Therefore, adopted Godin et.al, (2013) model and incorporated six empirically confirmed constructs to test factors that influence adoption and use of ICT for learning that including quality of internet connection, self-management, self-efficiency; social influence; Facilitated condition, compatibility and perceived usefulness the theoretical model the study tested is depicted in Figure

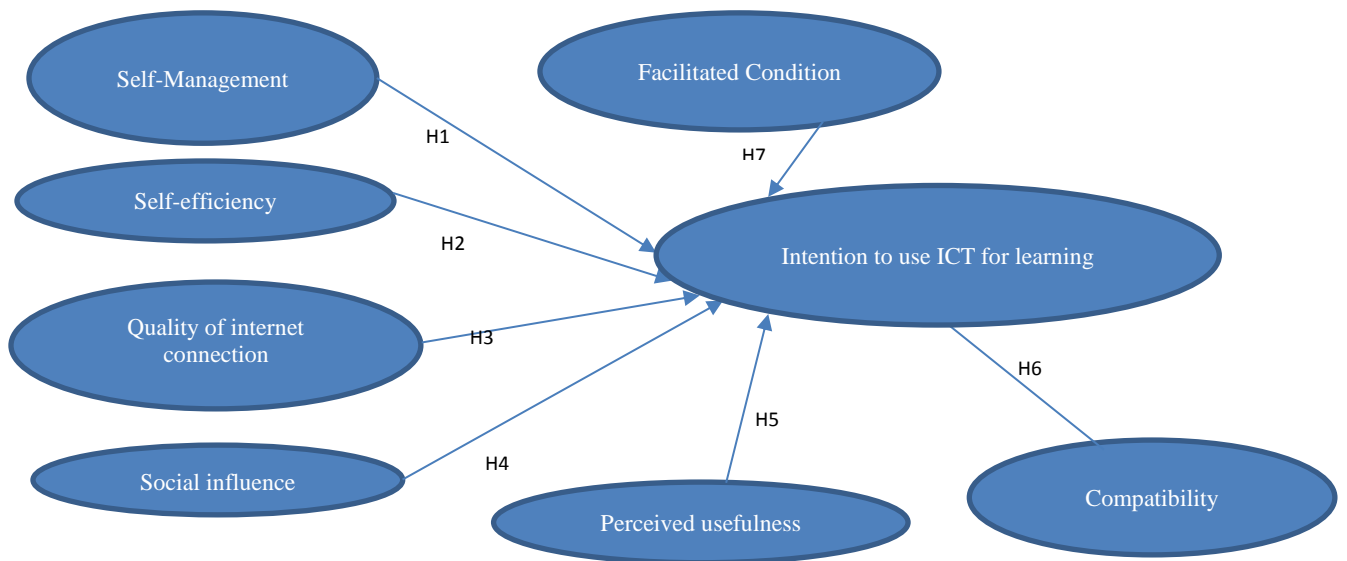


Figure 1. Female students Adoption and use of ICT for learning conceptual model

Self-management

Self-management of learning refers to the “extent to which an individual feels he or she is self-disciplined and can engage in autonomous learning” Schunk and Pajares (2002). Based on an exploratory study, Smith, Murphy, and Mahoney (2008) identify factors underlying readiness for online learning, the study concluded that people with better self-sufficient learning skills are more likely to adopt and use ICT as a tool for learning. Thus, we hypothesize that:

H1: Undergraduate female students’ self-management online learning will positively influence their intention to adopt and use ICT for learning.

Self-efficiency

Self-Efficacy is defined as the judgment of people's capability to organize and execute courses of action required to attain a designated type of performance (Bandura, 1977). The concept does not only include the skills that a female students has but also integrates judgment of what individuals can do with the skills they possess. We posit that female student's judgment about what they can do with their adopting and use of ICT as a tool for learning skills will affect their intention to use the system. Therefore, we hypothesize:

H2: Undergraduate female students' self-efficiency toward adopting and use of ICT as a tool for learning will positively influence in their intention to adopt and use ICT for learning.

Quality of internet connection

Quality Internet connection and access is one of the key factors that affect adoption and use ICT as a tool for learning. Hoffman and Novak (1996) have also found significant correlation between download speed and user satisfaction. In view of the above, we hypothesize:

H3: Quality of internet concoction have a direct effect on undergraduate female student's intention to adopt and use of ICT as a tool for learning.

Social influence

Social influence is defined as "the degree to which an individual perceives that important others believe he or she should use the new system". The constructs of social influence is represented as subjective norm and social norm in earlier behavioral theories. Social influence has been validated as an important factor in determining intention to use in many different contexts (Yang, Lu, Gupta, 2010). Social influence positively affect user's intention to adopt and use ICT as a tool for learning. The study hypothesis that:

H4: Social influence will positively influence undergraduate female students' intention to adopt and use ICT as a tool for learning.

Compatibility

Compatibility refers to the degree to which an innovation is perceived to be consistent with the existing values, prior experience, and needs of potential users (Rogers, 2003). Female student's acceptance and use of ICT for learning has a connection to compatibility of the work and value with the existing trend and situation of a students. The study also posit that female student's prefer easy access and use to ICT as a tool for learning In other words compatibility of a

technology for work functions can be expected to have a direct impact on the users' intention to use. We hypothesize:

H6: Compatibility will have a positive effect on female student's behavioral intention to adopt and use ICT as a tool for learning.

Perceived usefulness

Perceived usefulness is the degree to which a person believes that using a particular system would enhance his or her job performance (Davis, 1989). Female student's adoption and use ICT for learning enhance the efficiency and effectiveness of their learning. Consequently, we hypothesize:

H5: Perceived usefulness will have a positive effect on healthcare professional's behavioral intention to use mobile healthcare services.

Facilitated condition

Facilitating condition are defined as the degree to which an individual believes that an organization and technical infrastructure exist to support use of the system (Vankatesh et.al, 2003). Further Vankatesh et.al (2003) states that facilitating condition refer to an individual believes that an organizational and technical infrastructure exists to support use of the system. Accordingly, this study hypothesizes that:

H7: Facilitated Condition influence female student's intention to adopt and use of ICT as a tool for learning.

4. METHODOLOGY

The methodological approach is at the highest level of complexity, where the actual methods, techniques, and their underlying philosophies are articulated. A research methodology, therefore, refers to a collection of methods, techniques, assumptions, and values regarding their use in a given research context (Babbie & Mouton, 2001; Mitrovic, 2008).

The dominant methodologies appropriate with the positivist in IS research are the quantitative, and the qualitative research approaches. A choice of a methodology is informed by the research problem, a research question, the type data, data sources, format of seeking answers and the

required procedures of analysis (Neuman, 2006). If the researcher is dealing with non-explanatory, but actually deductive studies that produce empirically abstract data in the form of numbers (Neuman, 2006), this places more emphasis on the assigning of numbers “*to the perceived qualities of things*” (the quantification of constructs) (Babbie & Motoun, 2001).

The aim of the current study is to understand descriptions and explanations of the factors of ICT usage for female student at science and engineering discipline in ASTU, from the contextually subjective environments of lecturers and students in ASTU“ e-Learning spaces. The type of data in this instance is mostly in words that may be converted into a single common medium such as numbers. To this effect, a quantitative methodology, methods, and techniques would be appropriate for this study.

Moreover, the other methodology is qualitative methodology of research refers to a set of methods and techniques of collection and analyzing of data in the form of words, impressions, sentences, explanations and context interpretations etc. (as compared to quantitative hard data) (Neuman, 2006). The belief is not to separate the phenomenon of study from the subject, nor the subject from the context, as is often the case with quantitative methods. With a focus on investigating the phenomenon and its context, qualitative research methods allow a richer insight into an observation. The term “method”, which is second to the term “methodology” in the hierarchical structure of abstraction, refers to a combination of the practical means by which research activities are to be executed (Singleton & Straits, 2005). A research method, therefore, refers to the “class and cluster” or collection of techniques that are used to execute each and every research activity (Mitrovic, 2008).

One of the significant contributions of interpretive (or phenomenology) methods has been the development of case study methodological principals that, even if they are not based on positivist criteria, are still consistent with the conventions of positivism (Lee, 1989; Klein & Myers, 1999) and therefore provide a point of convergence between positivism and phenomenology. Qualitative methodology emphasizes the observational methods, such as interviewing, analysis of personal documents, or even participant observations (not participant action – PAR), using inductive analytical strategies such as grounded theory, activity theory, content analysis etc. (Babbie & Mouton, 2001).

4.1. Data collection

In this study used mixed data collection methodology such as survey questioner, semi structured interview, document analysis, participatory observation and group discussion.

4.1.1. Survey questioner

The study used survey questioner method to collect data and test the hypotheses of this study. All the survey questions were adapted from instruments validated in prior research; the only changes related to contextualization of the survey questionnaire to suit the female student intends to use ICT as a tool for learning that we were studying. When distributing the survey we provided background information on the definition and use of ICT adoption and use at engineering and science discipline. We captured demographic information, background information, student computer and internet experience of the respondents. Data was collected using a five points Likert scale with measures asking whether respondents strongly agreed, agreed, undecided, disagreed, or strongly disagreed vis-à-vis each item. We collected data from 220 female students that are enrolled in Adam Science and Technology University in engineering and science program. 120 out of the 220 respondents indicated that they were 2nd and 3rd-year students at an engineering and science discipline and the use of ICT as a tool for learning process. Demographic information of the survey respondents is depicted in table 3 in the base line survey result section.

4.1.2. Baseline survey results

Purposive sampling was used together survey data the detail of selection of respondents as follows in the table3.

Basic Demography (N=375)						
Age	(< 20) = 1	(26-30) = 45	(31-35) = 34	(> 35) = 5		
Gender	Female = 33	Male = 42	Missing = 5	N/A		
Educational level	1 st = 75	2 nd	3 rd	4 th	5 th	
Department	Civil eng.=40	Electrical eng.=35	Mechanical eng.=35	Agricultural eng.=20	Computing=50	Science =40
Computer	Private =120	Use Library =35	Use Laboratory=35	Use lab tope=40	Use tablet=20	Use mobile=75

Table3: Demographic characteristics.

4.2. Analysis, result, and discussion

For survey data analysis the causal effects theorized in our model are assessed using Partial Least Squares (PLS), a structural modelling tool using Smart PLS use of which has received great supported in prior research (Chin, 1998; Gefen, Rigdon and Straub, 2011; Wixom and Watson, 2001; Hair, Ringle, and Sarstedt, 2011). PLS is similar to regression with respect to component based structural equation modeling technique. However, it differs from regression analysis in two fundamental ways. First, it simultaneously models the structural model (i.e., theoretical relationships among latent variables) and measurement model (i.e., relationships between a latent variable and its indicators). Second, PLS algorithm allows each indicator to vary based on how much it contributes to the composite score of the latent variable rather than assume equal weights for all indicators. This means indicators with weaker relationships are given lower weights (Chin, Marcolin, and Newsted, 1996; Lohmöller, 1989; Wold, 1989).

The internal consistency, reliability, convergent validity, and discriminant validity of the measurement model were assessed by the quantitative strength of each of the paths in the measurement model (Chin, 1998; Wix-om and Watson, 2001). Internal consistency reliability is given by the Cranbach alpha values as presented in Table 2. All reliability measures were above the recommended level of 0.7 (Nunnally, 1967). This confirms the validity of the survey instrument.

Construct	Cronbach Alpha	Average Variance Extracted (AVE)	Composite Reliability
Perceived Usefulness	0.796511	0.8056764	0.880633
Self-management	0.849385	0.757901	0.897681
Compatibility	0.912751	0.745592	0.927576
Self-Efficacy	0.880316	0.852447	0.958494
Quality of internet connection	0.850877	0.799452	0.940959
Facilitating Conditions	0.912144	0.814376	0.936456

Social influence	0.83456	0.81326	0.96123
Intention to use			

Table 2: Validity and reliability of the measurement model.

Convergent validity is considered adequate when constructs have an average variance extracted (AVE) of at least 0.5 (Fornell and Bookstein, 1982). The AVE of each construct as presented in Table 2 is greater than the recommended 0.5 threshold. Convergent Validity is also confirmed when items load highly (greater than 0.5) to their respective reflective constructs (Fornell and Bookstein, 1982). All items have loaded highly, over 0.7 and above as shown in Table 2, once again confirming convergent validity.

To satisfy discriminant validity, the square root of AVE for each construct should be greater than the variance shared between the construct and other constructs in the model (Fornell and Bookstein, 1982; Gefen, Rigdon and Straub, 2011; Wixom and Watson, 2001). The square root of AVE (\sqrt{AVE}) results as shown in Tables 3 satisfies the recommended threshold confirming discriminant validity except the case of PU/FC where discriminant validity is not confirmed. This is a research is taken the data of one university the result may change if the data set will be varied and we will evaluate this further in the future study.

The structural model (figure 2) reveals the extent to which independent constructs explain the variance in a dependent construct's R^2 values. Based on the results depicted in Figure 2 the model explains 96.4% ($R^2=0.964$) of the variance in participants' intention to use ICT in education for learning – a successful implementation of our model over the collected data. All path coefficients indicate support for the hypothesized relationships with 95% confidence level ($p=0.05$).

With all hypotheses supported, this research extends Vankatesh et.al,(2012) ICT in education for learning adoption model by empirically confirming four additional constructs, namely quality of internet connection, self-management, self-efficiency and facilitating conditions. Our findings are consistent with prior studies where quality of internet connection (Negash, 2011; Pik-karainen, Karjaluoto, and Pahnla, 2004; Negash, Meso, and Wiredu, 2011) and facilitating conditions (Cil-liersand Flowerday, 2013) were confirmed as essential constructs in mobile services. Competence, self-management, self-efficacy have also been shown earlier to extend the TAM model (Wu, Wang, and Lin, 2007).

Self-management has a direct impact on the dependent variable (intention to use) as well as the mediating variables (intention to use). Furthermore, the structural model confirms that self-management self-efficiency and social influence has the strongest magnitude in the path coefficients. This implies that self-management, self-efficiency, and social influence are the most significant antecedent of use of ICT in education adoption of female student's in higher institution. This factors must be considered during the implementation of ICT in education system for female students in higher institution.

These findings are consistent with prior studies; for example, Holden and Karsh (2010) had confirmed the significance of self-confidence and self-control as well as social relation with other student's for implementing and using an online system in educational practices. Other studies (Hu, Chau, Sheng and Tam, 1999; Istepanian and Pattichis, 2006; Hung, Ku and Chien, 2012) have also shown that the importance of self-confidence and self-control when they are online.

There is increased interest in understanding the benefits that can be obtained from information technology investment in education such as improvement in educational quality, increased female student's satisfaction, decreased attrition rate female student's, and up-to-date and pertinent educational information. The explosion of ICT in education for supporting higher educational services has made it extremely important. Our study contributes to theory by providing empirical support that self-management, self-efficiency, social influence, facilitating conditions and quality of internet connection extend the Vankatesh et.al,(2012)in assessing participants' intention to use ICT in education. In addition to this considering the influence of self-management, self-efficacy, social influence, facilitated condition and internet network quality when we implement ICT in education system in Ethiopia, and especially for reaching distant need centers.

4.3. Result from qualitative data and analysis

From qualitatively collected data and analysis, document review and literature review, the study drive two main contribution : the challenge that faces female students in science and engineering and second based on the challenge, collects data qualitatively from teachers, students , IT experts from ASTU and document review the study proposed as a solution the appropriateness ICT to promote female students and develops a model that give insight to the

professional's in development and managements of the system. Some of the challenge and the proposed model described below are as follows:

4.3.1. Challenge of female students in engineering and science

Based on that the study identify some specific problem of female students in teaching and learning especially in the discipline of engineering and science. This problem is the big challenge that hinder female students from participating in engineering and science. In addition to this different literature discussed as cited on Appendix 1 (table 1) about the problem that affects female students. Consequently, the issue is attempts to examine the reason female students leave engineering and science discipline. When considering this body of literature as a whole, it is possible to identify a common set of factors that contribute to poor retention rates of female student in engineering and science discipline. Therefore, below each of these factors is discussed in greater detail and supporting evidence is examined.

4.3.1.1. Classroom and academic climate—teaching and advising

Inadequate teaching and advising was a commonly cited reason why students leave science and engineering majors (Lagoudas, 2009). Specifically, this study noted from document analysis , interview and group interview that the lack of faculty guidance and academic support, the lack of personal encouragement and attention from faculty members, the competitive environment fostered in engineering and science classrooms and mismatches between the way engineering is taught and the way students learn found that students who persisted in engineering and science, as well as those who left, cited poor teaching as an obstacle to their success. Further, it is found from the interview that teaching styles were more important in predicting student success in the classroom that was the students' amount of pre-college preparation, the study suggests that engineering instructors can play a crucial role in increasing retention rate.

4.3.1.2. Classroom and academic climate— individualistic culture

Another reason that female students provide for leaving engineering and science discipline is the individualistic nature of engineering and science classrooms and the engineering and science profession. Multiple female students indicated in the interview that engineering and science

students feeling a lack of engagement with their communities and other engineering and science students, a lack of a sense of belonging, a lack of personal identification with the field of engineering and an overall sense of isolation reported. Lack of a sense of belonging in the engineering and science discipline was the most important factor in a female student's decision to leave engineering. From the group interview, female students were more likely to persist if they had better support systems, that the individualistic focus was especially harmful to minority of female students, who often felt obligations to help others, serve their communities, and be role models.

4.3.1.3. Grades and conceptual understanding

Just more than half of the female students in the interview and group interview indicated that grades and conceptual understanding played a significant role in female students' decisions to leave engineering programs. Somewhat when we are looking engineering and science discipline, the students indicated that female students who left science and engineering majors were experiencing conceptual difficulties with their courses. Many female students in the interview indicates that low college grades, which are intended to serve as a measure of conceptual understanding, predict female student attrition from engineering and science. Many female students in the group interview reported that they were accustomed to being at the top of their classes and their grades were not meeting their expectations, or that they were unhappy with their grades, or that their grades were unequal to the amount of work required to attain them, or that they were experiencing discouragement and loss of self-esteem due to their low grades. So the study suggested from the collected data that the effects of low grades on major persistence may be stronger for female student's and cause for increasing attrition. Finally, this study conclude that while these grades provide some measure of conceptual understanding, low grades could also reflect other problem areas such as lack of interest in the field.

4.3.1.4. Self-efficacy and self-confidence

Some of female students who participate in group discussion indicate that low levels of self-confidence or self-efficacy are less likely to persist in engineering and science than students with higher levels of self-confidence and self-efficacy because the former are more likely to become discouraged by the competitive grading structure and individualistic climate of engineering and science classrooms. It is indicated by female students in the interview that when faculty members were accessible to female students, female students reported higher levels of self-efficacy and higher GPAs. In a relatively large survey, the study found that female students in engineering and science have lower levels of self-efficacy and self-confidence than do their male

peers, suggesting that these factors could play a role in increasing the female student's attrition rates.

4.4. An integrated components as a model for development and use of ICT as a learning tool

As a result of the interview with teacher and an IT experts in ICT center, ICT for learning system is useful when it enables interactive learning, flexible communication, and online submission of academic tasks, and the convenient access to learning content. It is considered educationally significant or insignificant, depending on whether it is used for administrative (insignificant) or for interactive instructional (significant) activities. Significant activities as indicated in the interview with teachers and ICT center experts in ASTU include the delivery of content as well as the holding of interactive discussions and synchronous events.

Educational technology experts at the universities of ASTU, further emphasize the significance of flexible access and the problem-solving aspects of an online learning environment. Above all, according to one of the IT experts, the central purpose of an ICT for learning should always be to improve the learning experience of a student. Obviously, this research proposes the development and use of ICT as a tool to advance other main objectives of the university that is to improve the participation of female students in engineering and science.

The effectiveness of the development and use of ICT as a tool, however, is determined not only by a mere presence of technical facilities alone. It is a result of a dynamic interplay between human and technical design factors (Piccoli, et al, 2001). In this respect, human factors would refer to individual aspects of a student and teacher. These factors would include self-motivation, self-efficacy, confidence and self-managements capabilities of students, as well as the instructor traits to flexible transition between teaching philosophies. Technical design factors on the other hand, refer to the more abstract aspects of the development and use of ICT as a tool such as the technology (hardware and software), course content, actual interaction between the learning parties and the content, and the control a student has on the learning process (Piccoli, et al, 2001). Improving learning efficiencies and ultimately, learning outcomes, however, should always be the central goal in the development and use of ICT as a tool and this study. To achieve this, the study recommended a careful balance between ICT tools, instructional strategies and psychological processes in instructional environments and the contribution of external environment, its contribution for female students.

In the development and use of ICT as a tool needs to subdivide the component into main three part: the means as it well known there are different ICT tools that may used as a means for teaching and learning such as Web-enabled teaching & course Management tools, E-Learning & Multimedia Tools Web-enabled learning programs Facilitative contexts and E-Learning Tools Network & System Applications Courseware design tools. the other are the main people that will be involved as main stockholder and user and may involve in the development and use of the system; producers that must be followed in the development and use the system. In addition to this, there is a system that may influence and had contribution in the development and use of the proposed system gender office and guidance and counseling office and it is considered in this study as external environment as shown in the figure2 below.

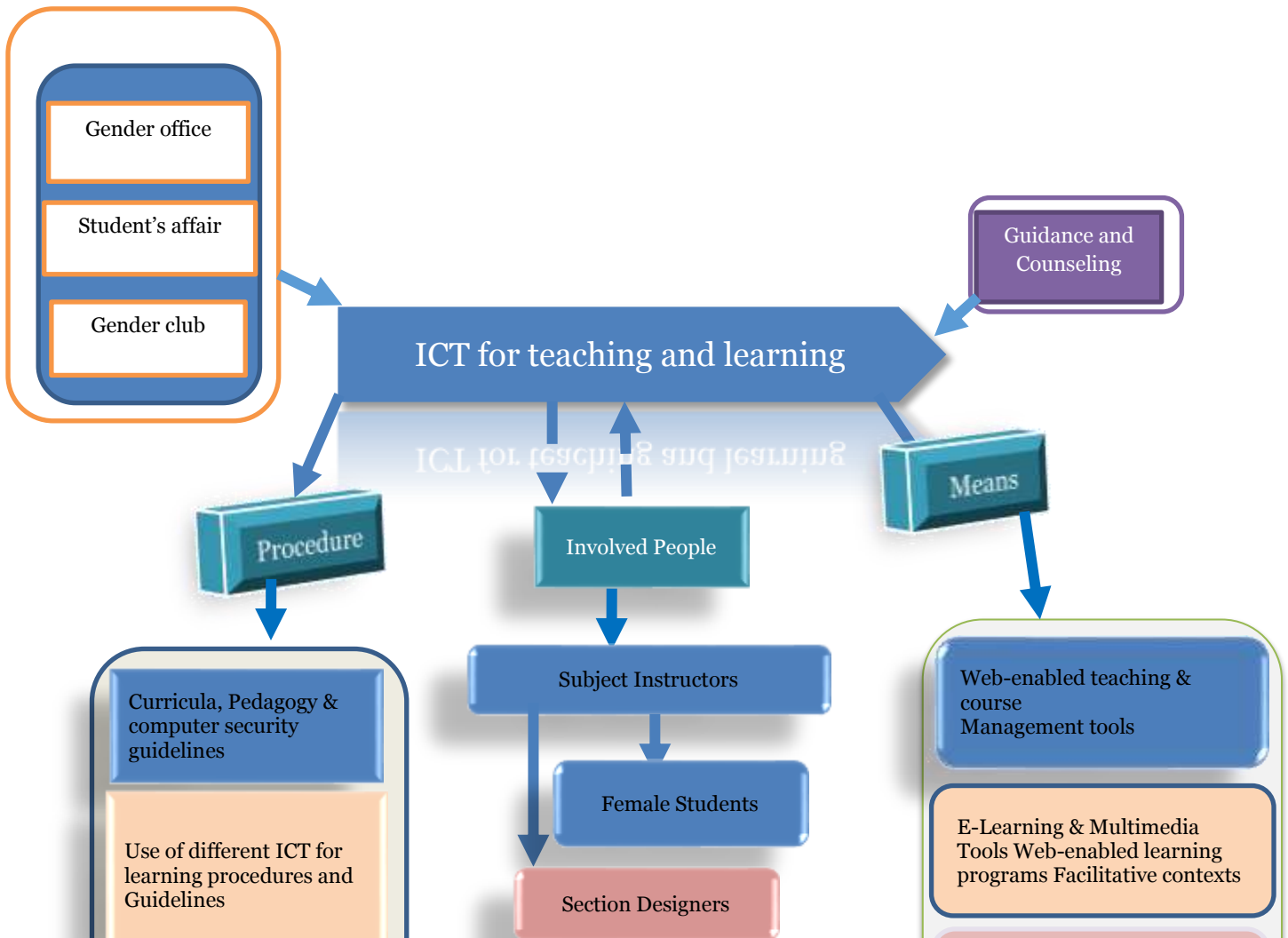


Figure 2. Proposed of ICT for learning tools Component) system

The central argument in this study's considering some components that support development and use ICT as a tool to promotes the participation of female students in engineering and science and improve the advancement of effective learning and learning outcomes. At the same time as effective learning is closely related to female student satisfaction with the learning experiences, learning outcome refers to the actual impact the female student takes out the learning process. To ensure that the development and use of ICT as a tool is designed and used to advance the teaching and learning in engineering and science the situation, educators need to understand not only the learning styles but also the determinants of learning outcomes over one an ICT as a tool means platform.

The determinants of ICT as tools outcomes include the female student's own personality characteristics that was identified in (3.4.) that in turn, influence their learning style. Determinants of learning outcomes also include the student's self-management, social influence and it the way interactions between instructor and learner, the instructor's facilitation skill, pedagogy competency, the quality and efficiency of the actual technology as well as skill and self-efficacy (or confidence) with the use of a computer.

In conclusion, it has been clearly shown in group interview and survey that female students have different capabilities and styles of learning. As such, educators should start by understanding the meaning and factor influence female students in adopting and using of ICT as a tool for learning before deciding on the way to use an ICT as a tool. In other words, a linkage between learning objectives, pedagogy, and learning styles should be reflected in the features, tools, and

purposes of an ICT as a tools and appropriating the system used with purpose of promoting female students in engineering and science.

5. Conclusion

This study has achieved the intended response to the basic concept of research question that has driven the investigation. In addition, it also achieved the general and specific objective formulate in order to seek proper response to research question. The first research question intended to identify current status of ICT usage in ASTU. Eventually, the study identify the current usage and its purpose of usage of ICT by students. In addition to this the research as a second research question intended to identify the determinant factors of adoption and usage ICT by female students. Eventually, the study identify nine silent determinant. Five of the determinant have drawn from the conceptualization of technology acceptance model and have empirically tested and found relevant.

The remaining four determinant are drawn from the quantitative analysis made and call for future operationalization and validation. The third research question intend to cover the way the use of ICT promote female students participating in higher institution. In order to respond to this question, ICT as a learning tools are proposed and feedback was gathered from female students and teacher and finally, the study come up with most important elements for using the system as a daily work practice in teaching and learning system to promote female students participation in engineering and science.

In the process of addressing the cited research question, the study explored the technical and behavioral factors that have impact on the use of and adoption of ICT for learning. Finally, the usage of ICT as a learning tools with some additional module that is specific to female students and has great contribution for the participation of female students in higher institution.

In addition to this the research investigate the major components that must be considered during the development and use ICT as a tool. The study has drawn relevant insight for the promotion of female student's participation in teaching and learning in engineering and science discipline. To this end, mixed data collection methodology will help to capture the full picture of the phenomena under investigation.

6. Reference

1. Cilliers, L. and Flowerday, S.V. (2013). Health information systems to improve health care: a telemedicine case study, *South African Journal of Information Management*, Vol. 15, No. 1, p.5.
2. Godin, J. and Goette, T. , (2013). A review of models: virtual teamwork training model and UTAUT. *SAIS 2013 Proceedings*. Paper 10.
3. Hu, Paul Jen-Hwa and Hui, W. ,(2010) . Examining Effects of Technology-Assisted Learning on Learning Effectiveness and Satisfaction: A Quasi-Experimental Study" (2010). *PACIS 2010 Proceedings*. Paper 89.
4. Hair, J.F., Ringle, C.M. and Sarstedt, M. (2011) 'PLS-SEM: indeed a silver bullet', *Journal of Marketing Theory and Practice*, Vol. 19, No. 2, pp.139–152.
5. Hoffman, D.L., and Novak, T.P. (1996). Marketing in hypermedia computer-mediated environments: conceptual foundations', *Journal of Marketing*, Vol. 60, No. 3, pp.50–69.
6. Holden, R.J., and Karsh, B.T. (2010). The technology acceptance model: its past and its future in health care, *Journal of Biomedical Informatics*, Vol. 43, No. 1, pp.159–172.
7. Koppi, T., Roberts, M. & Naghdy, G. (2012). Perceptions of a gender-inclusive curriculum amongst Australian information and communications technology academics. In M. de Raadt & A. Carbone (Eds.), *Proceedings of the Fourteenth Australasian Computing Education Conference, ACE2012* (pp. 7-14).
8. Lang, C.; Meyer, D.; Niner, S.; McKay, J.; and Lewis, S. (2009).The Impact of Gender and Pedagogical Factors on Female Pass Rates, *Communications of the Association for Information Systems*: Vol. 25, Article 28.
9. Lee, V.and Lin, Shin-jeng, (2008). Podcasting Acceptance on Campus: An extension of the UTAUT Model. *DIGIT 2008 Proceedings*. Paper 3.
10. Negash, S., Meso, P.N. and Wiredu, G.O. (2011) 'Mobile banking adoption in the United States: adopting mobile banking features from low-income countries', *Proceedings of SIG GlobDev Fourth Annual Workshop*, Shanghai, China, 3 December.
11. Roberts, M. R. H., McGill, T. J. & Hyland, P. N. (2011). Why students leave their ICT degrees: A gender comparison. *ACIS 2011 Proceedings* (pp. 1-10). Sydney, Australia: Australian Computer Society.
12. Sorby, S., Nevin, E., Behan, A., Mageean, E. and Sheridan, S. (2014). Spatial Skills as Predictors of Success in First-year Engineering. In *Proceedings 44th Annual Frontiers in Education (FIE) Conference*, pp. 111-117. 22-25 October. Madrid, Spain.

13. Tesfalidet Ketema & Mungamuru Nirmala (2015). The Impact of E-Learning to Enhance Quality of Education: The Case of Adama Science and Technology University. *Afr J. of Comp & ICTs*. Vol 8, No. 1. Pp 155-162.
14. Yang, S.C. and Farn, C.K. (2009) 'Social capital, behavioral control, and tacit knowledge sharing: a multi-informant design', *International Journal of Information Management*, Vol. 29, No. 3, pp.210–218.
15. Yi, M.Y., Jackson, J.D., Park, J.S. and Probst, J.C. (2006) 'Understanding information technology acceptance by individual professionals: toward an integrative view', *Information & Management*, Vol. 43, No. 3, pp.350–363.
16. Yu, C.S. (2012) 'Factors affecting individuals to adopt mobile banking: empirical evidence from the UTAUT model', *Journal of Electronic Commerce Research*, Vol. 13, No. 2, pp.104–121.
17. Zheng, Folayan D. (2009). The College Role in Diminishing the Digital Divide Gender Gap: Assessment of Male vs. Female Computer Access and Use, "*McNair Scholars Research Journal*: Vol. 2: Iss. 1, Article 3.
18. Piccoli, G., Ahmad, R., and Ives, B. 2001. Web-based virtual learning environments: A Research Framework and a Preliminary Assessment of Effectiveness in Basic it Skills Training. *MIS Quarterly*, 25, 4, 401-426.
19. Neuman, W.L. 2006. *Social Research Methods: Qualitative and Quantitative Approaches*, 6th Ed. USA; Viacom
20. Mlitwa, N., Van Belle, J.P., and Madhusudhan, M. 2009. The use of ICT for Teaching and Learning in South African Higher Education Institutions; *Information Science, Technology & Management: Sustaining Knowledge Proceedings of the 7th Annual Conference on Information Science, Technology & Management Sustaining a Knowledge Economy New Delhi (Gurgaon), India, July 13-15, 2009*, ISBN: 978-1935160-06-9
21. Mitrovic, Z. 2008. *ICT and Small Business Development, the Importance of Government Support and Community Involvement: A Theoretical Framework for the Adequacy of Electronic Small Business Development Services*; Thesis Submitted to the Faculty of Informatics and Design (FID), Cape Peninsula University of Technology (CPUT), in Fulfilment of a Doctor of Technology (DTech) Degree.
22. Meyer, Matthew, "Persistence of Engineering Undergraduates at a Public Research University" (2015). *All Graduate Theses and Dissertations*. Paper 4261.
23. Lagoudas N.C. (2009), *Women in engineering at the undergraduate level*, Honors Fellow Thesis, Texas A&M University.

24. Khan, S., Hasan, M. and Clement, C. (2012). Barriers to the introduction of ICT into education in developing countries: The example of Bangladesh. *International Journal of Instruction*, Vol. 5(2), pp. 61-80. Available online at http://www.e-iji.net/dosyalar/iji_2012_2_4.
25. Sanga, C., Magesa, M. M., Chingonikaya, E. & Kayunze, K. A. 2013. “Can e-learning participation of female students in STEM disciplines in higher learning institutions of Tanzania a?” , *International Journal of Education and Development using Information and Communication Technology (IJEDICT)*, vol.9, no.3, pp. 86-102.
26. Sife, A., Lwoga, E. & Sanga, C. 2007. “New technologies for teaching and learning: Challenges for higher learning institutions in developing countries”, *International Journal of Education and Development using Information and Communication Technology (IJEDICT)*, vol. 3, no.2, pp. 57-67.

7. Appendixes’

Appendix 1

Table .1. Attrition rate of female students in ASTU from 2004-2006 per semester in Ethiopian calendar

Academic year	Number of Students enrolled in percent		Attrition rate	
	Male	Female	Male (%)	Female (%)
2004 I semester	84%	16.50%	5.20%	16%
2004 II semester	85.40%	14.60%	5.20%	14%
2005 I semester	80%	20%	2.30%	6%
2005 II semester	79.60%	20.40%	3.20%	10.50%
2006 I semester	76.60%	23.40%	2%	9%
2006 II semester	75.50%	24.50%	2.20%	9%

Appendix 2.

Table .2. ICT usage by students in ASTU

Purposes of ICT in education Usage in ASTU For	Students
Communication	10%
Study	30%
Access information	35%

Entertainment	20%
Participation online discussion	1%
Research	4%

Appendix 4

Table3. Matrix that shows challenge of female student’s with the proposed ICT as a tools system

Matrix of that shows how challenge of female students at Science and engineering will be easily solved by using ICT as a tool for learning		
challenge of female students in engineering and science discipline(from literature and group discussion with students)	Proposed solution	Develop ICT as a tool for learning that have the following
Class room and academic climate – academic support form teacher	Using the ICT as a tool for a learning tools	
Individualistic nature	Using discussion forum as to discuss the difficulties	Forum and creating group discussion part

	with friends and teachers	
Having less Grade in engineering and mathematics course	Using online material and resources of the course uploaded by course teachers	Course management parts
conceptual understanding	Using assignment and quiz part through online access of the ICT as a tool system	Assignment and quiz part
Self- efficiency or self-confidence	Online discussion with other colloquies and Experience sharing	Online discussion forum
Time management	Pages that support female students to show and give instruction how to manage their time properly	Online support like frequently asked question and help desk
Understanding the working culture	Experience sharing pages by those willing female and gender office expertise	- Online discussion forum and sharing experience from senior student's
Role model	Adding the page that shows those world successful and innovative woman's	-having the page that shows successful and role model female students in their history and address

Appendix 5

Interview questioner for teacher and IT experts

1. What is the current available tools used for teaching and learning in your institution or whichever you understand it, when did you first encounter to the concept and practices?

2. How do you describe about the value of ICT as a tools system in higher institution comparing to the current system used in your institution for teaching and learning?
3. How easy is the current application to use it by students or other people as a user?
4. You have been using ICT as a tools for a year or a few month, has it been out of your own choosing or because of some institutional policies, that have been using it?
5. If there was no institutional policies in the higher education would you still using it?
6. How do describe your knowledge of using ICT as a tools for teaching and learning?
7. Do you comment on the technical adequacy in the functionality of currently used teaching and learning system or additional functionality if it is available for professional or for other people as a user?
8. IS there any teaching and learning application for female students as a user's in higher institution?
9. If you have anything to add any information you consider important that we may have overlook?

Appendix 6

Table 3. List of literature review about the specific problem of female students at higher institution

Authors	Data type	Institutions	Major of discipline	Focus of the study	Factor identified
Bell et al. (2003)	Experimental	Public Research University	Engineering	Women	Inadequate teaching and advising Lack of faculty guidance,
Leuwerke et al. (2004)	Longitudinal & Survey	Unknown	Engineering	Women	encouragement, support, and attention
Ohland et al. (2004)	Longitudinal	Unknown Universities	Engineering	Women	Competitive or hostile environment
French et al. (2005)	Longitudinal & Survey	Unknown	Engineering	Women	Inadequate teaching style
Fleming et al. (2006)	Interview	Unknown	Engineering	Women	Individualistic culture
Suresh (2006)	Interview, Longitudinal, & Survey	Research University	Engineering	Women	Lack of sense of engagement or belonging Sense of isolation
Bernold et al. (2007)	Longitudinal & Survey Engineering	Public Research University	Engineering	Women	Conceptual difficulties
Haag et al. (2007)	Survey	Public Research University	Engineering	women	Low course grades drive students away (regardless of conceptual understanding)
Johnson (2007)	Survey	University	Science	Minority Women	High school preparation
Rask & Tiefenthaler (2008)	Longitudinal	Private, Baccalaureate	Arts& Sciences Economics	Women	Inadequate mathematics preparation
Lagoudas (2009)	Interview	Research University	Engineering	Women	Inadequate science, physics, and chemistry

					preparation
Kokkelenberg & Sinha (2010)	Longitudinal	Public Research University	Science and engineering	Women	Inadequate overall high school
Ohland et al. (2011)	Longitudinal	9 Universities	Engineering	Women & Minorities	GPA Inadequate high school class rank ACT/SAT scores
Griffith (2010)	Longitudinal	National Data	Science and engineering	About female students	Inadequate teaching and advising
Ost (2010)	Longitudinal	Research University	Sciences	About female students	Lack of faculty guidance, encouragement, support, and attention
Wee et al. (2010)	Focus Group & Survey	Unknown	Engineering	Women	Competitive or hostile environment
Tyson (2011)	Longitudinal	Multiple Universities	Engineering	Women	Inadequate teaching style
Geisinger and Raman (2013)	Survey	Public university	Engineering	Women	Individualistic culture Lack of sense of engagement or belonging

Appendix 5

Survey Questioner for students

*The following are questionnaires' of the research work in titled: **filling the gender gap in teaching and learning via ICT** The term **ICT**, defined as “... the use of ICTs to enhance and support teaching and learning processes. It is the instructional content or learning experiences delivered or enabled by electronic technologies and it incorporates a wide variety of learning strategies and technologies. Use of ICT as a learning tools ranges from the way students use e-mail and accessing course work online while following a course on campus to programmers offered entirely online. Please insure that the information gathered about participants will be treated confidentially, and only group data will be reported as an outcome of this research.*

Thank you for taking the time to answer the questionnaires.

Background Information

1. Your educational level : please circle from the list below

1. 1st year
2. 2nd year
3. 3rd year

4. 5th year
5. Graduate
6. Others (specify if any)_____

2. Gender 1. Female 2. Male

3. Age:

1. 20-25 2. 26-30 3. 31-35 4. Above 35

4. Your department

1. Civil Engineering 2. Electrical Engineering 3. Mechanical Engineering

4. Agricultural engineering 5. Wood Engineering 6. Computing

7. Natural Science

5. Do you have computer?

1. Disk top 2. Laptop 3. IPod 4. Other

6. How many hours spend per day on the computer?

7. How many hours spend per day on the internet?

8. For what purpose do you use computer?

1. for papering essay 2. For reading 3. Using education software 4 Entertainment

9. For what purpose do you use the internet?

1. Contacting lecturer 2. Tutors 3. To participate online discussion

4. Downloading material 5. submitted course work 6. Entertainment

Please circle the appropriate number to indicate the level of your agreement or disagreement with the following statements on a scale of 1 to 5, where 1 = strongly disagree, 2 = disagree, 3 = neutral (neither disagree nor agree), 4 = agree, and 5 = strongly agree.

No	Questions	strongly disagree	disagree	Natural	Agree	Strongly agree
1	I find ICT as a tools system easy to use	1	2	3	4	5
2	Learning how to use an ICT as a tool system is easy for Me	1	2	3	4	5
3	It is easy to become skillful at using an ICT as a tool System	1	2	3	4	5
4	If I use ICT as a tools would improve my learning performance	1	2	3	4	5
5	If I use ICT as a tools would increase academic productivity	1	2	3	4	5
6	If I use ICT as a tools could make it easier to study course content	1	2	3	4	5
7	Studying through ICT as a tools is a good idea	1	2	3	4	5
8	Studying through ICT as a tools is a wise idea	1	2	3	4	5
9	Assuming I have access to ICT as a tools system for education If I use ICT as a tools, I intend to use it.	1	2	3	4	5
10	Given that I have access to computer devices for ICT as a tool, I predict that I would use it.	1	2	3	4	5
11	If I have access to computer devices for ICT as a tool, I want to use it as much as possible	1	2	3	4	5
12	I feel confident finding information in the ICT as a tool system	1	2	3	4	5
13	I have the necessary skills for using an ICT as a tool system.	1	2	3	4	5
14	What ICT as a tool stands for is important for me as a university student	1	2	3	4	5
15	I like using ICT as a tool based on the similarity of my values and society values underlying its use	1	2	3	4	5
16	In order for me to prepare for future job, it is necessary to take ICT as a tool courses	1	2	3	4	5
17	I have no difficulty accessing and using an ICT as a tool system in the university	1	2	3	4	5

18	I have the resources necessary to use ICT as a tool	1	2	3	4	5
19	I have the knowledge necessary to use ICT as a tool	1	2	3	4	5
20	ICT as a tool are compatible with other learning material I use	1	2	3	4	5
21	I can get help from others when I have difficulties using ICT as a tool	1	2	3	4	5
22	Using ICT as a tool is entirely within my control	1	2	3	4	5
23	Using the ICT as a tool take up too much of my time when performing many tasks	1	2	3	4	5
24	When I use the Internet, I find it difficult to integrate the results into my existing work	1	2	3	4	5
25	Using the Internet exposes me to the vulnerability of computer breakdowns and loss of data	1	2	3	4	5
26	I would be able to use computer devices for ICT as a tool at any time, from anywhere	1	2	3	4	5
27	I would find computer devices for E- learning easily accessible and portable	1	2	3	4	5
28	Computer devices for ICT as a tool would be available to use whenever I need	1	2	3	4	5