INTEGRATING INTERNET INTO ENGINEERING EDUCATION: A CASE STUDY OF STUDENTS' USAGE AND ATTITUDES IN FACULTY OF ENGINEERING, AHMADU BELLO UNIVERSITY

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Abstract. The attitude of students towards the integration of the internet as a study tool and communication channel in teaching and learning in engineering has been investigated. A study was carried out in the Faculty of Engineering, Ahmadu Bello University Zaria, Nigeria, aimed at investigating the effect of certain variables such as gender, course of study, computer experience, and the percentage of internet usage on teaching and learning processes. A well-structured questionnaire was administered to a randomly selected five hundred (500) male and female students across the seven (7) departments of the faculty and about 85% were filled and returned. The study also examines the university management's perspectives and strategies to incorporate internet usage in teaching and learning processes especially in engineering. Amazingly, responses received showed that experience in the use of the computer in surfing the internet for problem based activities mainly affects the level of internet usage across the faculty. This factor makes some students to misplace their priority in internet usage emphasizing on e-mail correspondence and social networking rather than sourcing for information and solving problems as

it is done by a few students. Furthermore, findings support that internet cannot entirely substitute for traditional teaching and learning processes like text reading but can serve as a reasonable alternative when the latter is unavailable.

Keywords: technology- based teaching, internet in engineering education, World Wide Web, user attitude

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Introduction

The use of technology in the classroom has increasingly been the subject of many studies in recent years (Al-Habis & Al-Kandary, 2000). The world is witnessing an explosion of on-line and distance learning practices, which are attributed to a number of factors. These factors, which are largely valid in developing countries (such as Nigeria) as well as developed (advanced) countries, are recent advances in information technology, the declining cost of computers, impressive increase in access to the internet, continuous improved quality of multimedia software, the need of corporations to maintain a competitive workforce in the globalized economy, the desire of non-traditional students to eliminate the skill gap with traditional university students, and the tremendous increase in the magnitude of information (Jebreen & Jamal, 2008; Al-Najaar, 2001; Koohang, 2004; Al-Ani, 2000).

Engineering education, in particular will need to use ICT to advance the learning process, make learning more effective, and more universal (Al-Ebaid, 2002; Bome'rafi, 2001).

The internet is considered to be the most prominent in modern technology and in the modern revolution of information and communication. Increasingly, students should make use of this technology to acquire skills and knowledge. Furthermore, literature on instructional technology shows that the use of internet in teaching has the potential to motivate both students and

teachers, increase their participation and interaction in the classroom, provide students with a more active role in their learning, and help to facilitate cross-curricular work among other advantages (Ghandoor, 1999).

The use of internet in engineering education can achieve many advantages like: rapid understanding, flexibility in time and place, high speed in creating new programs compared to the systems of videos and CD-ROM, changing the style of the teacher from lecturing to guiding and monitoring, creating classes without walls, getting the study materials any time and from any location and getting the views of scientist and scholars in various fields (Madden et al., 2005; Attwenger, 1997).

Currently, most universities are introducing a variety of internet services in their faculties in order to cope with new technology trends and to advance knowledge. Indeed, the internet service has become available to all teaching staff and to students in most of the world, while studies have revealed low degree of internet usage in the universities for learning (Dutta & Taghaboni-Dutta, 2002; Fukumoto et al., 2002; Peterson & Feisel, 2002; Moscinski, 2008).

Ahmadu Bello University has recommended that e-learning must be integrated with conventional method in an attempt to advance the learning process. However, this may pose a challenge to students who have different computer abilities, different degrees in internet usage and different motivations for internet use. Moreover, there are no studies that address all the above variables altogether. It has been noticed that there are differences in terms of ability, training, and technical skill amongst students in their use of internet during their university studies. This is what gave rise to the present study, for it aims to study the nature, degree, and other factors that govern internet usage in university education. Furthermore, this paper tries to reflect on the students' attitudes towards the use of internet in addition to the traditional learning process in engineering. Thus, an answer to the following question was sought:

What is the real situation of the use of internet by the engineering students in the Faculty of Engineering, Ahmadu Bello University, Zaria in their academic pursuit and how they feel about this issue? This question is divided into the following sub questions: (i) are there any statistically significant difference at level (α= 0.05) in the percentage of internet usage among the students of the faculty of engineering according to the variables of the study; (ii) what is the degree of internet usage by the students in engineering education at the university; (iii) what do students feel about the incorporation of new technologies in the teaching process; (iv) can a traditional learning system be substituted by another system that is based on e-learning methods.

Therefore, the objectives of this study include: (a) to examine the effect of internet usage on the university teaching and learning process, more importantly, engineering education; (b) to study the relationship between internet usage in the learning process and the variables such as gender, course of study and computer experience among university engineering students; (c) to study the attitudes of the students towards such type of learning (d) to report some useful feedback for the Ahmadu Bello University in its pursuit to employ new technologies using the findings from this work.

Methods and procedures

The population consists of all the students of the faculty of engineering who were registered for the second semester of the academic year 2012/2013. A total of four thousand one hundred and eighteen (4,118) students at the undergraduate level were registered for that semester (Office of the Dean, Faculty of Engineering, Ahmadu Bello University, Zaria). Out of this number, a sample of randomly chosen five hundred (500) students was approached and questionnaires were administered to them. Only four hundred and forty eight (448) of the questionnaires were filled and returned at the time of compilation which represents 89.6% of the study population.

Methods and procedures

Methods and instruments

As the case of many other studies, the descriptive survey method was used to study the variables. The method includes functions like the frequencies, the percentage and post comparisons. Data were collected using a questionnaire prepared after a critical review of literature related to this field. The study used the method of gathering personal data and questions that are related to the level and percentage of internet usage in university engineering education. The questionnaire composed of five (5) study sections as follows:

- General Information
- The level of students usage of internet and computer
- The degree of using internet in university education.
- The internet topics in which students desire to develop their knowledge
- The attitude of using internet in engineering education.

Procedures

The following procedure was adopted for the study:

- The total number of students who were registered for the second semester of year 2012/2013 was collected.
- The questionnaires were distributed to the students during their classes and were collected after the class time.
- The data in the completed questionnaire were collated.
- The questionnaire results were analyzed using Statistical Package for the Social Science (SPSS).

Variables: independent variables

1. Gender: male, female

2. Course of study (Mechanical, Chemical, Agricultural, Civil, Electrical, Water resources and Metallurgical & Materials Engineering)

3. Level which is based on sequence of students progression till graduation (100L, 200L, 300L, 400L and 500L)

4. Computer experience (Low: less than two years; Moderate: 2-5 years; High: more than 5 years).

Variables: dependent variables

a. The percentage of internet usage which represent the internet usage in numbers depending on the independent variables. This can be classified into three main intervals (low, moderate, high).

b. The degree of using internet in university education.

c. The internet topics in which students desire to develop their knowledge

d. The attitude of using internet in engineering education.

Results and discussion

The information gathered from the questionnaire is summarized in Tables (Appendix) while some are presented in Figures. The analysis of these information using chi-square method (not shown) show that all the dependent variables are significant at level $\alpha = 0.05$. This implies that all the variables are significant to this study. Figures 1-8 briefly analyzes responses from the questionnaire administered.

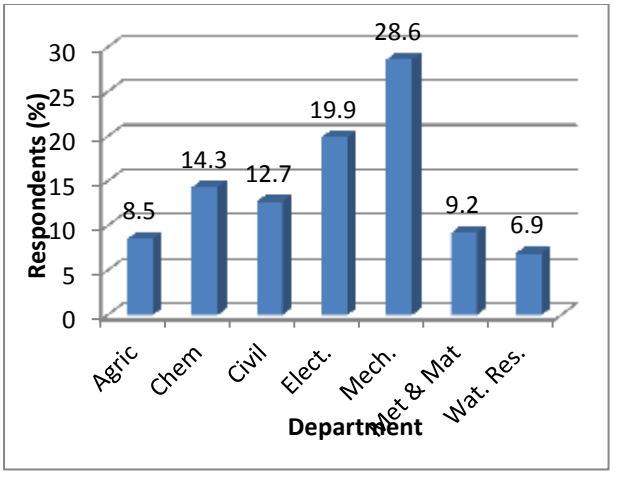

Fig. 1. Respondents according to course of study

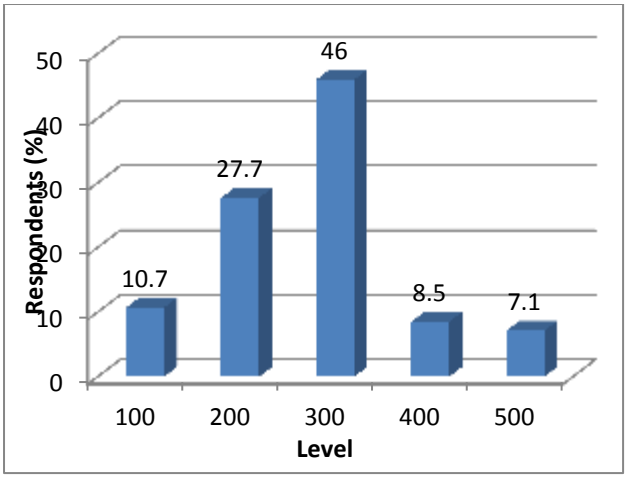

Fig. 2. Respondents according to level

From the results obtained from the analysis as presented in Figures 1 and 2, it can be observed that students from the mechanical engineering department responded more to the questionnaire administered as compared to other students. This could be by virtue of their numerical advantage in terms of students in the various departments. Also larger percentages of the re-

spondents are 300 level students; this can be associated to the level of commitment they have for activities happening on the campus as intermediate students compared to those of higher or lower levels.

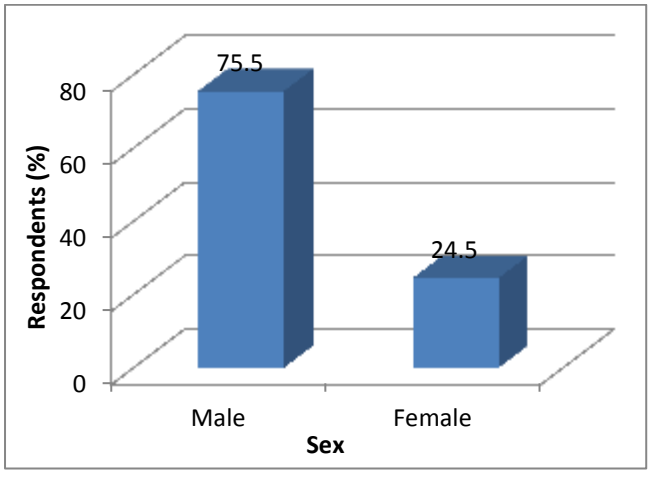

Fig. 3. Respondents according to gender

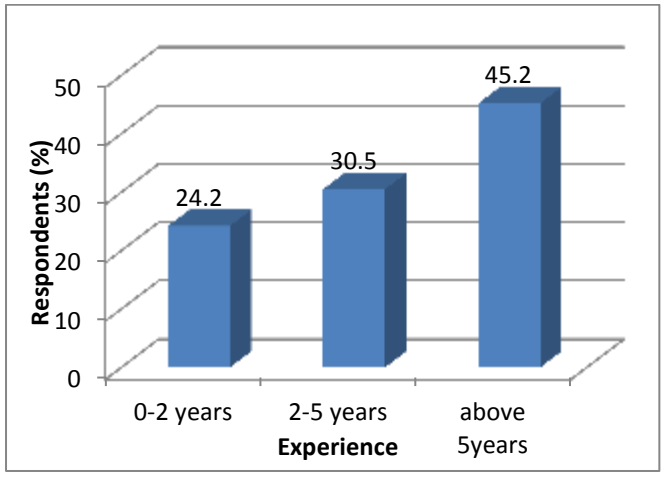

Fig. 4. Respondents according to students' computer experience

From Figure 3, male students are more than female students in the faculty. This can be associated to the phobia female students have towards study-

ing engineering courses as non-tradition courses for them. Figure 4 shows that 45.2% of the respondents have above 5years of computer usage experience while only 24.2% have below 2years of experience. This implies that majority of the students in the faculty have computer knowledge which is expected to aid their rate and interest in internet usage.

The level of internet usage for general purposes among students is presented in Figure 5.

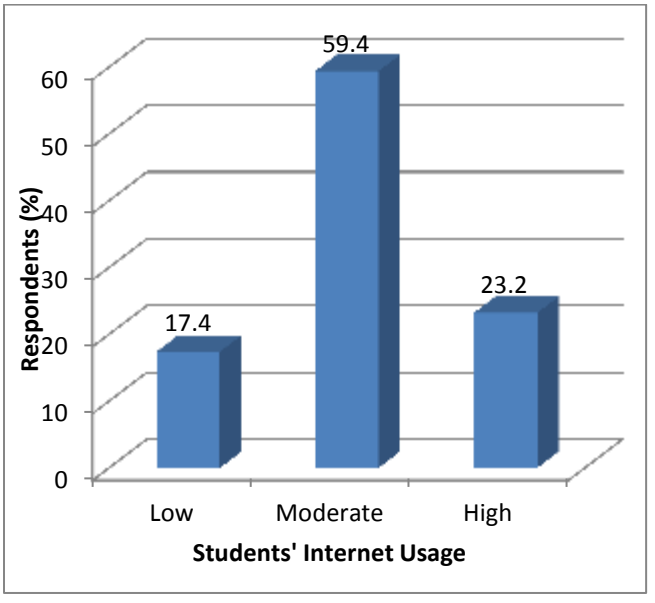

Fig. 5. Respondents according to students' general internet usage

The analysis shows that 59.4% of students moderately use internet as compared to 23.2% and 17.4% of high and low usage respectively. Gender also plays a major role in the level of internet usage among students. This can be associated with dependency of the few female students on their male counterparts in solving problems given to them by their lecturers.

Generally, larger percentages of students use internet moderately, this implies that there is a reasonable rate of internet dependency by the students

in gathering information or solving problems. Considering why moderate usage outwits high usage, one could argue that despite their level of experience in computer usage, the students still prefer other sources like text reading to internet facilities.

The perspective of students to the integration of internet to education system and their usage for educational purposes is presented in Figures 6-8.

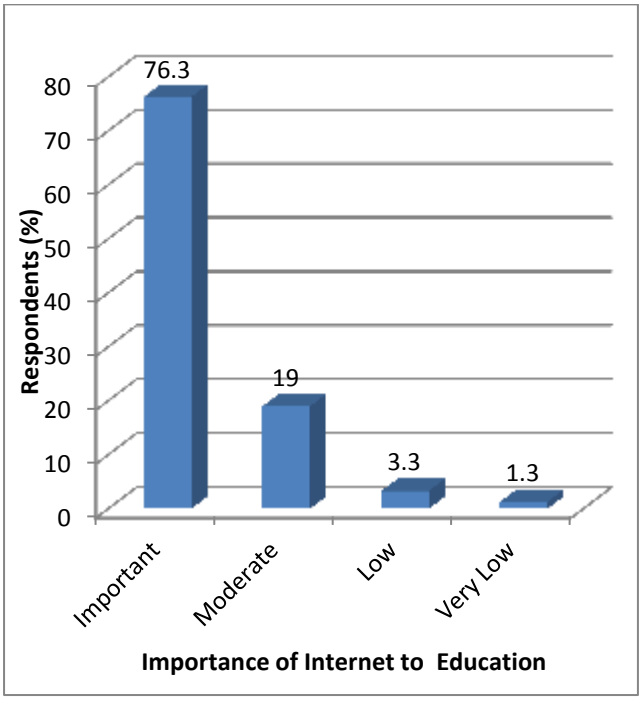

Fig. 6. Respondents' opinion on importance of internet to education

From the analysis, the students accord high level of importance to integration of internet into engineering education. This was deduced from responses as 76.3% agreed that the integration was important. This implies that the rate of inclusion of internet into engineering education is highly significant.

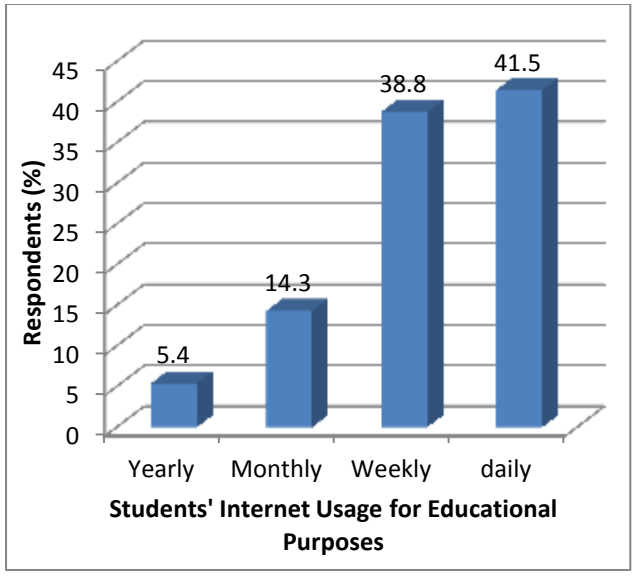

Fig. 7. Respondents frequency of internet usage

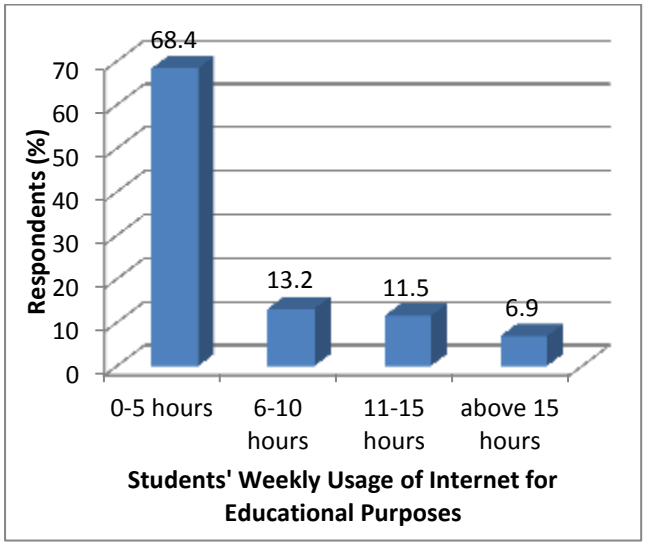

Fig. 8. Respondents according to weekly internet usage

Also, Figures 7 and 8 show that 41.5% of the students' access internet daily but 68.4% of the students access the internet for less than 5hours weekly respectively. This represents larger percentages of the respondents and is in agreement with early conclusions that the students depend less on internet for information gathering or other uses.

Table 1. Internet topics

Internet Topics	Great desire (frequency)	Great desire (%)
1)Search data by index	155	38.8
2)Internet application	273	63
3)Search data by addresses	166	41.5
4)Chatting	134	41.5
5)E-mail	189	44.9
6)Games down load	116	28.2
7)Web browsing	282	67
8)Software Down Load	234	54.3
9)Designing web-based courses	187	43.2
10)Attending a course using internet and its applications in education	249	56.7

The results on Table 1 show that the most important topics in ascending order were web browsing with 67% desire, internet application in checking relevant data in education with 63%, attending a course using internet and its application in education with 56.7% and software download with 54.3%. The rest of the percentages ranged from 44.49% for e-mail to 28.2% for electronic games downloading. These results indicate that although students wish to familiarize themselves with all the aspects of internet, effective web browsing was the most required part. Overall, these results indicate a strong desire among students to possess internet technology and use its applications in university education and in their public life. These results are in agreement with

the studies of other researchers (Ghandoor, 1999) which empasizes the continous use of the internet techology for enhancement of ideas.

Table 2. Students' attitude to internet usage

No	Students' Attitude to Internet Usage	Strongly Agree (frequency)	Strongly Agree (%)
1	Importance of internet as a source of information	176	39.6
2	Students dislike e-learning	69	15.8
3	These sites support reinforce the education process	178	40.6
4	Support positive effect of e-learning on the teaching environment	192	44.2
5	Access previous lecture notes on websites	134	30.2
6	Student do not favour the use of these sites	82	18.8
7	Students prefer to get the results of examination via websites	127	29
8	E-learning can totally substitute traditional learning.	106	24.5
9	Internet facilitate the learning process	152	34.4
10	Internet facilitate concept inventory	153	34.9
11	Students surf the internet for information	143	32.9
12	Technological advancements such as power point etc aids understanding	155	35.6
13	Special skills are not required in the use of the internet	112	25.7
14	Assisted learning internet sites are suitable for engineering courses	128	30
15	All universities present its courses via internet.	55	12.6

Table 2 presents results on the attitude of the students towards the use of the internet as a substitute or partial substitute for traditional learning. After careful review of the overall results in Table 2, it was observed that the use of

the internet is important in two aspects. First, 44.2% of the students agreed that internet can serve as general informative resource that could impact positively on learning process while about 40.6% of the students believe that internet usage can act as a standalone teaching resource that would complement the traditional teaching methods. Finally most of the students believe that integrating internet into the traditional system have a very positive effect on enhancing the outcome of the learning process on both technical depth and grades.

This indicates that students support the use of internet in the teaching process. However, the study results also shows that there is a negative aspect of internet usage as 15.8% of the students dislike it while 12.6% supports the presentation of courses via internet. This could be associated to lack of live interactivity between students and lecturers found in the real classrooms. Moreover, the students believe that some topics will require face to face dialogue which cannot be done by such kind of teaching method.

Conclusion

This paper addressed the effect of integrating internet into the traditional teaching process along several aspects. The results of this study showed that there is a necessity for using internet in all universities. Engineering faculties and students should be encouraged to use the internet in order to enrich their learning outcomes and experience. The results also show that students are to be encouraged to use internet in engineering education and this should be done by the teacher and adopted as a university policy. The authors believe that there is a great necessity to conduct more research related to internet usage that deal with other variables such as students' academic and educational level and his/her culture in the field of internet, the relationship between students attitude toward using internet and their ability to use it.

REFERENCES

Al-Ani, W. (2000). The role of the internet in promoting scientific research among students of Yarmouk University. *King Saud University, 12*(2), 307-335.

Al-Ebaid, E. (2002). *The beneficial use of internet by Riyadh City High School teachers from the Web: master thesis.*Riyadh: King Saud University.

Al-Habis, A.& Al-Kandary, A. (2000). The scientific bases for teaching unit via internet. *Educ. J., 57*, 167-195.

Al-Najaar, A. (2001). The reality of using for scientific research for staff at King Faisal University. *Educ. Researches Center J. Qatar University, 10*(19), 135-160.

Attwenger, K.V. (1997). Computer and internet use among special education graduate sttudents. *ERIC Document Reproduction Service, no. ED407941*.

Bome'rafi, B. (2001). The reality of using internet by Sharja University staff. *J. Educ. Collage, 6*, 112-118.

Dutta, D. &Taghaboni-Dutta, F. (2002). E-technologies in interdisciplinary education: engineering and business perspectives. *Proc. eTEE, Davos,* pp. 33-35.

Fukumoto, M., Yamamoto, H., Shiraki, D., Faujita, Y. &Sakaguchi, S. (2002). *Proc. eTEE, Davos,* pp. 54-58.

Ghandoor, M. (1999). King Saud Faculty usage of internet. *9th International Conference of Internet in Education.* Riyadh: King Saud University.

Jebreen, M.& Jamal, A.-k. (2008). Integrating internet into traditional education: apractical sudy of university students' usage and attitudes. *Intern. Arab J. Information Technology, 5*, 241-250.

Koohang, A. (2004). A study of user's perceptions towards e-learning courseware usability. *Intern. J. e-Learning, 3*(2), 10-17.

Madden, A., Ford, N., Miller, D.& Levy, P. (2005). Using the internet in teaching:the views of practitioners –asurvey of the views of secondary school teacher in Sheffield, UK. *British J. Educ. Technology, 36,* 255-280.

Moscinski, J. (2008). Example of LMS based assessment in engineering education. *Proc. Intern. Conf. Eng. Educ. & Res., Czech Republic.*

Peterson, G.D. &Feisel, L.D. (2002). E-learning: the challenge for engineering education. *Proc. eTEE, Davos,* pp. 164-169.

APPENDIX

Study Questionnaire

1. Introduction

This questionnaire is designed to seek your opinion about the level of internet usage in the teaching and learning processes in the faculty of engineering. Any information provided will be treated confidentially and will be used for the purpose of recommending to relevant authorities after the completion of the study.

2. General Information

i. **Department**: [ ] Agric. [ ] Chem. [ ] Civil [ ] Elect. [ ] Mech. [ ] Met & Mat [ ] Wat. Res.
ii. **Level**: [ ] 100 [ ] 200 [ ] 300 [ ] 400 [ ] 500
iii. **Sex**: [ ] male [ ] female
iv. **Internet and Computer usage experience**: [ ] 0-2 years [ ] 2-5 years [ ] > 5 years.

3. The level of internet and computer usage in university education and its variety.

Your level of internet and computer usage in general [ ] Low [ ] Moderate [ ] High

4. The degree of using internet in university education

i. The importance of using internet in university education from your point of view:

[ ] Important [ ] Moderate [ ] Low [ ] Very low

ii. The degree of importance you accord to usage of internet for educational purposes.

[ ] Important [ ] Moderate [ ] Low [ ] Very low

iii. The number of times of your usage of internet for educational purposes.

[ ] yearly [ ] monthly [ ] weekly [ ] daily

iv. The number of hours of your usage of internet for educational purposes weekly:

[ ] < 5 hours [ ] 6-10 hours [ ] 11-15 hours [ ] >15 hours.

5. The Internet Topics in which you desire to develop your knowledge (thick appropriately and as many sub-topics as required)

No	Sub Topic	Great desire	Medium desire	Little desire	No desire
1	Search data by index				
2	Internet application in learning				
3	Search data by addresses				
4	Chatting				
5	E-mail				
6	Games Down Load				
7	Web browsing				
8	Software Down Load				
9	Designing web-based courses				
10	Attending a course in using internet and its applications in education				

6. How do you feel about using internet in the learning process? (thick appropriately for ALL the sub-topics as required)

No	Sub Topic	Great desire	Strongly Agree	Agree	I don't know	Disagree	Strongly Disagree
1	Students consider the sites on internet as sources of information.						
2	Students hate e-learning because they cannot communicate directly with professors across these sites.						
3	Students believes that these sites sup-						

	port and reinforce the education process						
4	The use of these sites have impacted positively on my academic achievement.						
5	Students can access previous lectures notes or lecture content on the website of the course.						
6	Students do not favour the use of these sites for lack of the spirit of participation in the classroom.						
7	Students prefer to get the results of my examination via websites.						
8	Students use e-learning sites for the purposes of interaction with students.						
9	Students believe that interaction between each other across these sites facilitate the learning process from their colleagues						
10	Students feel that these sites encourage them and discuss ideas and concepts related to the courses.						
11	Students use internet regularly to find information related to their lessons						
12	Latest technological advancements such as (power point) are used in regularly engineering education as an aid in understanding the content of the course.						
13	You believe that the use of these sites does not require the possession of special computer skills.						

14	Students think that assisted learning Internet sites suitable for all engineering courses.						
15	All universities present its courses via internet.						

Please, give your view and recommendations on internet usage in this faculty.
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