

**Patterns and Levels of Use of the Internet by Faculty
Members at King Saud University, Riyadh Campus**

Dr. Bader A. Al-Saleh Associate Professor Department of
Instructional
Media & Technology College of Education, King Saud
University

The Educational Journal, vol.19, No.75
June, 2005, The university of Kuwait

PATTERNS AND LEVELS OF USE OF THE INTERNET BY FACULTY MEMBERS AT KING SAUD UNIVERSITY, RIYADH CAMPUS

ABSTRACT

The Internet and its powerful tool, the World Wide Web (WWW), is considered by many as a vehicle to transform education and instructional methods. However, there exists few research that addresses the status quo of use of the Internet in education in general and higher education in particular. Therefore, there is a need to determine current applications of the Internet at the university level. The purpose of this study was to investigate current patterns and levels of use of the Internet and the WWW by faculty members at King Saud University, Riyadh Campus. Results indicated a low to moderate use of the Internet and the WWW by faculty members. The most prevailing level of use of the Internet was the supplemental level. Most faculty perceived most of Ely's eight conditions of innovation adoption as very important toward facilitation and encouragement of using the Internet in education.

Introduction:

Many regard the Internet as one of the most important and powerful tools ever invented in human history; a tool that dramatically changes the way people communicate, learn and interact with each other (Wilson & Ryder 1996, Maddux 1996, Wang 1998, Newby et al.2000). Indeed, advances in information technology (IT) have inspired both advanced and developed nations to invest in IT in order to expedite changes and improvements in their educational systems. In 1991, for example, the U.S. spending for IT grew to a record of \$112 billion, thus, exceeding for the first time in history spending for industrial age capital goods (\$ 107 billion) (Stewart 1997; Cited in Trilling & Hood, 1999, p.5). In Saudi Arabia, private computer training companies are everywhere, including, in school training provided by such companies as Future kids; a computer conference is held annually under the supervision of the Saudi Computer Association; and more importantly, a major project (WATANI) is

currently underway to integrate IT into Saudi public schools across the country. In short, IT based educational reforms seem to have become a hallmark in many countries in recent years.

Among the various tools over the Internet, the WWW seems to hold great promises for teaching and learning. Harmon and Jones (1999, p.423) envision such promises: "...We argue that the Web will be incredibly valuable for education in the near and distant future." Alessi and Trollip (2000, p.399) state: "The Web may indeed be the critical application that brings computer technology into the mainstream of the educational enterprise. However, realization of the WWW and the Internet in general as a powerful teaching and learning tool depends on many factors among which is the individual who will eventually put it into daily uses. In universities, the individual faculty member plays a significant role toward such realization. Therefore, data about how faculty value and use the Internet and the Web into their professional work is needed to support long term technology integration into instruction and learning. However, to date scarce research in Saudi Arabia has dealt with the use of the Internet and the Web in schools in general and universities in particular. Wang (1998, p.455) expressed similar concern about this problem in the United States: "..... research investigating the use of the variety of Internet services by faculty on university campus is lacking".

Purpose of the study:

The primary purpose of the study was to identify patterns and levels of use of the Internet and the Web by faculty members at King Saud University, Riyadh Campus (KSURC). Other secondary purposes included identification of faculty Internet experience, their training strategies to use the Internet, amount of time spent on such use, and perception of Ely's conditions of innovation's adoption.

Background:

KSU is the largest university in the Kingdom of Saudi Arabia. Its main campus is located in the capital city of Riyadh, with a branch in Qusaim area, some 300 K.M. north of Riyadh.

Riyadh campus houses more than 13 colleges and institutes, over 40,000 students, and more than 1600 faculty members. The campus has a well computer network infrastructure where all colleges have network connection to the Internet. Most faculty members have PC's in their offices with easy and free access to the Internet, in addition to many computer labs across the university.

Significance of the study:

The study is important for a number of reasons:

- Scarce research that investigate the use of information technology in Saudi universities exists; in fact this is not unusual, for such technology is of a recent development.
- Identifying factors that affect utilization of the Internet and the WWW can help designing effective strategies to promote the use of the Internet for teaching purposes.
- The present study attempted to examine the status quo (patterns and levels of use) of the Internet in a typical large public university in Saudi Arabia, hence, developing a knowledge base that may supports decision making process related to instructional technology institutitization.

Dffinition of Important terms:

- Patterns of use of the Internet and the WWW: categories of using the Internet and the WWW by faculty: Teaching, Research, Communication, and Publication.
- Levels of use of the WWW in Teaching: levels at which faculty use the WWW in teaching: zero, Informational, Supplemental, Essential, Communal, and Immersive levels.
- Conditions of Innovation Adoption: conditions that facilitate technology innovation (See section on Theoretical Framework).

Research Questions:

The Study attempted to answer the following questions:

1. What are the most prevaillig patterns of use of the Internet and the WWW by faculty members?

2. What are the most prevailing levels of use of the WWW for teaching purposes by faculty members?
3. What is the perception of faculty members toward the importance of conditions that facilitate their use of the Internet and the WWW in teaching?
4. Are there significant differences in the patterns of use of the Internet and the WWW among faculty members from different colleges, ages, nationality, academic ranks, teaching experiences, and training?
5. Are there significant differences in the levels of use of the WWW for teaching purposes among faculty from different colleges, nationality, academic ranks, teaching experiences, and training?
6. Are there significant differences in perceived importance of the conditions of innovation adoption among faculty members with different levels of use of the WWW?
7. Are there significant differences in the patterns of use of the Internet and the WWW and in the levels of use of WWW between faculty in science colleges and faculty in human science colleges?

Limitation of the Study:

The Study is limited to faculty members at King Saud University, Riyadh Compus only, thus, generlization of results is limited to this audience only.

Procedures

Population:-

The target population for this study was comprised of all faculty members at KSURC. As of April 14, 2001, there has been 1620 faculty members at KSURC. The researcher acquired a computer printout list of the names of faculty members in each of the thirteen colleges in Riyadh Campus. From this list, the researcher drew the sample of the study.

Sample:

A sample of 20% (324 subjects, male and female) of the total number (1620) of faculty members was randomly drawn. To insure representative of the sample, 20% of subjects was

randomly drawn from each college. Of the 324 questionnaires distributed, 205 were completed and returned. This constituted a response rate of 62%. Response rate by colleges is presented in table 1.

Table (1) Response Rate by Colleges.

College	F	%
Pharmacy	10	4.9
Architecture	10	4.9
Applied Sciences	9	4
Education	36	17.6
Administrative Sciences	14	6.8
Arts	32	15.6
Agriculture	14	6.8
Science	23	11.2
Computer Science	6	2.9
Engineering	22	10.7
Dentists	8	3.9
Medicine	16	7.8
Linguistic	5	2.4
Total	205	100

Instrumentation:

The instrument used for this study was a researcher-developed questionnaire based on review of related literature (see the theoretical framework). The questionnaire was designed in a way that makes it as short as possible in order to encourage completion and return. It consisted of four sections (See Appendix). The first section included demographic information. The second section dealt with patterns of use of the Internet and the WWW, and consisted of four statements pertaining to four patterns of use of the Internet and the WWW; these are: teaching, research, communication, and publication. The third section included six levels of using the WWW for teaching purposes. Suggested by Harmon and Jones (1999), these levels are: zero, informational, supplemental, essential, communal, and immersive levels. Finally, the fourth section included Ely's eight conditions of innovation adoption (Ely, 1999): dissatisfaction with the status quo, existence of knowledge and skills, availability of resources, rewards or incentives exist, availability of time,

participation, commitment, and leadership. In order to keep the questionnaire brief, each of these conditions was represented by a single statement.

Date Collection:

The questionnaires were passed to and collected from colleges 'deans and or departments' heads or secretaries by the researcher himself. Despite the fact that three follow-up contacts was made by the researcher throughout the second semester of the 2001 academic year, and despite the assistance of many colleges, deans, department heads, and secretaries, the return rate did not exceed 62%. The researcher learned that faculty members are overwhelmed, tired, and bored of answering many questionnaires from within and outside the university.

Data Analysis:

A current version of the SPSS was used to analyze the obtained data. T-test, one-way ANOVA, frequencies, and percentages were used in the analysis. Tables and figure were used to present and discuss the data.

Validity and Reliability:

Face Validity*:

Four faculty members of the Department of Instructional Media and Technology and the Department of Curriculum and Instruction, reviewed

*The researcher wishes to extend his thanks to Drs.:M.Al-Mushaikeh, A.Al-Akeely, F.Al Fahad, and A.Al-Hadlaq, for their review of the questionnaire.

the questionnaire. Feedback was used to clarify some words, statements, as well as the addition of item number four in section two as suggested by one of the reviewers.

Validity of Internal Consistency:

The Pearson Correlation Co-efficient was used to test the internal consistency of the items in the second and fourth sections of the questionnaire. Responses of a sample of 69 subjects of which 40 were Saudis, 27 Non-Saudis, and 2 were unspecified, were included in determining the correlation coefficients of these

items. Results showed that the correlation coefficients for the items 1 through 4 in section two were $r=.68$, $.82$, $.76$, and $.92$ respectively; and for items 1 through 8 in section four were $r=.55$, $.41$, $.62$, $.59$, $.66$, $.77$, $.57$, and $.65$ respectively. All these correlation coefficients were significant at the $.01$ level.

Reliability:

Responses of 69 subjects were analyzed to test the two sections (two and four) of the questionnaire applicable to a reliability test. The Cronbach alpha was used as a statistical method to test the reliability of items in these two sections.

The reliability value was as follows: section two: $\text{Alpha}=.71$, and section four: $\text{Alpha} = .79$.

Theoretical Framework

The advent of the Internet and the WWW presented a real challenge for schools, colleges, and universities. Web-based instruction or tele-learning is a multi-faceted phenomenon (Collis, 1996, p.11), It has many interwoven factors, human and non-human. One of these factors, the issue of change at the individual and organizational level is particularly important, because “ the introduction of the Internet into an instructional environment can change more than just the delivery and reception of information, it can affect the entire educational system” (Reiser & Demsey, 2002, p.243). Thus, to deal with the issue of change, Harmon and Jones (1999, p.323,324) proposed a framework to be used when considering the implementation of Web-based instruction. This Framework was rewritten by Harmon, Jones, and Lowther as a chapter in the book edited by Reiser and Dempsey (2002). The researcher used this framework to develop the third section of the questionnaire which dealt with levels of using the WWW in teaching. Below is a brief description of these levels.

Level 0: No web use at all.	The default level implies no web use at all.
Level 1: Informational	Providing relatively stable information to the student typically

consisting of instructor-placed items such as the syllabus, course schedules, and contact information. This sort of information is easily created by the instructor or an assistant, requires little or no daily maintenance, and takes up minimal space and bandwidth.

Level 2: Supplemental

Provides course content information for the learner. May consist of the instructor-placed course notes and other handouts. A typical example would be a powerpoint presentation saved as an HTML document and placed on the web for student to review later.

Level 3: Essential

The student cannot be a productive member of the class without regular web access to the course. At this level the student obtains most or all of the written course content information from the web.

Level 4: Communal

Classes meet both face-to-face and on-line. Course content may be provided in an on-line environment or in a traditional classroom environment. At this level students generate much of the course content themselves.

Level 5: Immersive

All of the course content and course interactions occur online. Does not refer to the more traditional idea of distance learning. Instead, this level should be seen as a sophisticated, constructivistic virtual learning community.

Ely (1999) reported the findings of a series of studies conducted in different countries about the conditions that

facilitate the adoption and implementation of innovations. Instead of studying factors or conditions of failure of innovations, Ely (1999) investigated the factors or conditions of success. The findings included eight facilitative conditions that facilitate the implementation of innovation. These conditions, which the researcher used to develop section four of the questionnaire, were as follow:

- 1- ***Dissatisfaction with the status quo.*** Things could be better. Others seem to be moving ahead while we are standing still. Dissatisfaction is based on an innate feeling or is induced by a “marketing” campaign.
- 2- ***Knowledge and skills exist.*** Knowledge and skills are those required by the ultimate user of the innovation. Without them, people become frustrated and immobilized. Training is usually a vital part of most successful innovations.
- 3- ***Availability of resources.*** Resources are the things that are required to make implementation work-the hardware, software, audiovisual media, and the like. Without them, implementation is reduced.
- 4- ***Availability of time.*** Time is necessary to acquire and practice knowledge and skills. This means good time-company time and not just personal time at home.
- 5- ***Rewards and/or incentives exist.*** An incentive is something that servers as an expectation of a reward-a stimulus to act. A reward is something given for meeting an acceptable standard of performance.
- 6- ***Participation.*** This is shared decision making-communication among all parties involved in the process or their representatives.
- 7- ***Commitment.*** This condition demonstrates firm and visible evidence that there is endorsement and continuing support for the innovation and their supervisors.
- 8- ***Leadership.*** This factor includes leadership of the executive officer of the organization and, sometimes, by a board and leadership within the institution or

project related to the day-to-day activities of the innovation being implemented.

Finally, a number of researchers addressed purposes of using the Internet and the WWW. Wang (1998), Starr and Milheim (1996), and Spotts and Bowman (1995) reported different purposes of using the Internet by faculty. They studied uses of the Internet and the WWW for teaching, collaboration, research, communication, and publishing purposes. These studies formed the basis for developing the second section of the questionnaire which dealt with the patterns of using the Internet and the WWW investigated in the present study.

Literature Review

In this section, review of research pertinent to the present study is briefly discussed.

Al-Mohaisen (2000) investigated the status quo of, barriers to, and attitude toward computer utilization by faculty at the colleges of education in Saudi Universities. Results of this survey study (n=135) revealed that low utilization of computer by faculty, inadequate computer services, inadequate computer training on the part of faculty, and lack of computer technicians were the most important barriers to such utilization. The study showed that teaching experience was not a factor in computer use, and that academic specialization was a source of variance in such use; science faculty were more active users than human science faculty.

Al-Amri (1993) studied factors influencing the use of microcomputer by faculty at King Saud University. Results indicated that faculty did not use microcomputers unless they were required courses in computer science, that computer use depends on whether or not tasks performed require such use, that faculty in higher academic degrees used microcomputer significantly more than those in lower degrees, and that male faculty used computer significantly more than females.

Ali (1995) (cited in Al-Mohaisen, 2000) studied variables related to computer use by students and faculty in Saudi higher education in southern province. Results showed that the most important reason for using computer was carrying out official assignments, and the most important reasons for not having a computer were lack of training and high cost.

Wang (1998) studied several variables related to the use of the Internet services and tools in a public university in the United States. Results were as follows:

More faculty used e-mail over three hours per week; major reasons for using Internet service were to communicate with professionals and friends, exchange experiences with other professionals, generate ideas for teaching and research; non-users lacked skills necessary to use the service, 78% of subjects considered e-mail important and very important, 63% for mailing list, and 74% for the WWW; there was no effect of gender on Internet use, and that faculty in the 31-40 age group were the most active in using Internet tools.

The study also indicated that faculty used the WWW, Gopher, and FTP more for research than for teaching. The researcher recommended training provision at the university, college, and department levels, to encourage faculty use of Internet tools.

Ravitz (1998) reported data from a national survey of teachers in 250 schools registered in the National School Network, a project funded by the National Science Foundation since 1994. Ravitz (1998) examined Ely's (1990) conditions that facilitate innovation adoption. The overall results indicated that the conditions that seem to be most predictive of use of computer based technology included knowledge and skills to use technology as well as dissatisfaction with the status quo.

Buck and Horton (1996) assessed use of information technology by Public School's teachers. Results showed that variables that differentiate technology users from non-users were positive attitude toward the benefits of information technology and teachers' willingness for future technology training. Results also indicated that technology use was significantly related to such variables as availability of computers in classrooms and in-

service training. Factors such as age, gender, years of teaching experience, pre-service technology credits, and availability of a computer lab were not found to be significantly related to technology use.

Jaber and Moore (1999) examined factors not addressed in previous research (e.g. Internet access, type of training), which influence K-12 teachers' use of computer based instruction. Results showed that access significantly influenced frequency of use, and that teachers received most of their training from their peers and by being self-taught. The researchers concluded that classroom access to computer is a key factor to using computer instructionally, and that the major reason for low use of the Internet by teachers was lack of access to the Internet.

Ely 1999 reports on various studies that examined conditions that facilitate innovation implementation of instructional technology in various settings and cultures. Overall results, support these conditions in facilitating sustained use of instructional technology.

Spotts and Bowman (1995) investigated information technology knowledge and experience in a public university in mid western USA. Results indicated that word processing was the most frequently used technology in teaching, while distance learning was the least used technology. Faculty academic rank did not have influence on levels of knowledge and experience, but college in which they teach and home computer ownership had some influence.

Starr and Milheim (1996) examined uses of the Internet; they found that subjects used e-mail and the WWW for communication purposes; only 40% used the Internet for classroom materials or for student research. Barriers to the Internet use included limited access, concern about the quality of materials available, and lack of knowledge about how to incorporate it into curricula.

Findings and Discussion

In this section of the study, findings will be presented and discussed according to the sequence of the questions listed previously.

Demographic Information:

- Colleges participating in the study: Thirteen colleges were included in the study. Table 1 presents return rate from each college participating in the study.
- Age: The most dominant average age of faculty participating in the study was from 41 to 50 years (47.3%), followed by those from 30-40 years (26.8%), 51-60 (22.0%), and over 60 years (3.9%).
- Nationality: of the 205 subjects completed the questionnaires, 129 (62.9%) were Saudis, 72 (35.1%) were non Saudis, and 4 (2.0%) were un specified.
- Academic rank: Close frequencies characterized the academic ranks of faculty participating in the study (n=205) with more professors (40.5%) compared to associates (28.8%) and assistants (29.8%)
- Years of Teaching Experience: of the 205 faculty participating in the study, 131 (64.2%) have had 10 or more years of teaching experience, followed by those with 4 to 6 years of teaching experience (17.6%), 7-9 (8.8%) and 1-3 (9.3%).
- Training on use of the Internet: Subjects were asked to check all that apply from six types of training on use of the Internet. As table 2 indicates, most faculty (79.5%) learned the Internet vid self-training.

Table (2) Types of Training to use the Internet.

Type of Training	F	%
No Training	19	9.3
Self-Training	163	79.5
Colleague's Assistance	49	23.9
Training outside univ.	18	8.8
Training inside univ.	12	5.9
Other	3	1.5

Results of Research Questions:

Question 1. what are the most prevailling patterns of use of the Internet and the WWW by faculty members?

Four categories of patterns of use of the Internet and the WWW were chosen for this question. Respondents were asked to check the average weekly hours spent in using the Internet and

the WWW in each pattern. Thus, the most prevailing patterns(s) is the one(s) that has the highest average of weekly hours. Table 3 presents data related to this question.

Table (3) Frequencies and percentages of average of weekly hours of using the Internet and the WWW in each pattern.

Patterns of use of the Internet & the WWW	Average of Weekly Hours											
	0		1		2		3		4		5+	
	F	%	F	%	F	%	F	%	F	%	F	%
Teaching	64	31.2	70	34.1	30	14.6	22	10.7	7	3.4	12	5.9
Research	18	8.8	32	15.6	51	25	31	15.2	22	10.7	50	24.4
Communication	39	19.0	58	28.3	40	19.5	25	12.2	20	9.8	23	11.2
Publication	126	61.5	39	19.0	20	9.8	9	4.4	4	2.0	7	3.4

Question 2. what are the most prevailing level of use of the WWW for teaching purposes by faculty members?

Harmon's and Jone's (1999) classification of the levels of use of the WWW was chosen to answer this question. Respondents were asked to check only one level that represents their current use of the WWW for teaching purposes. Table 4 shows results of this question.

Table(4) Frequencies and percentages of levels of use of the WWW for teaching purposes.

Levels of use of the WWW for teaching purposes	F	%
Level 0: No Web use	73	35.8
Level 1: Informational	40	19.5
Level 2: Supplemental	85	41.5
Level 3: Essential	4	2.0
Level 4: Communal	1	.5
Level 5: Immersive	1	.5
Total	204*	99.5*

*Missing Cases = 1 (.5%)

Question 3. What is the perception of faculty members toward the conditions that facilitate their use of the Internet and the WWW in teaching?

The researcher used Ely's eight conditions of innovation adoption (Ely, 1999). Subjects were asked to check whether they perceive each condition as very important, some what important, or not important. (See table 5).

Table (5) Frequencies and percentages of perceived relative importance of Ely's conditions of innovation adoption.

Ely,s Conditions of Innovation Adoption	Perceived Importance of Conditions					
	Very important		Some what important		Not important	
	F	%	F	%	F	%
1.Disatisfaction with the status quo	98	50.0	79	40.3	19	9.7
2.Existence of knowledge & skills	152	75.6	44	21.9	5	2.5
3.Availability of Resources	164	80.4	36	17.6	4	2.0
4.Availability of time	113	59.5	67	35.3	10	5.3
5.Rewards or incentives exist	115	57.5	67	35.3	18	9.0
6.Participation	68	33.2	110	55.0	22	11.
7.Commitment	120	59.7	77	37.6	4	0
8.leadership	131	64.9	65	32.2	6	2.0
						3.0

Note: Missing cases in each conditions, beginning with condition #1, were as follows:9, 4, 1, 15, 5, 5, 4, &3 respectively.

Question 4: Are there significant differences in the patterns of use of the Internet and the WWW among faculty members from different colleges, ages, nationality, academic ranks, teaching experiences, and training?

One way ANOVA and t-test were used where appropriate to analyze data related to this question. The results were obtained by calculating individual subjects' average weekly hours spent in using the Internet and the WWW in the four patterns of use and comparing these results with individual subjects' Colleges, ages, nationality, academic ranks; teaching experiences, and training. The results were as follows:

-Results of one way ANOVA indicate that there were significant differences in the patterns of use (the average weekly hours) of the Internet and the WWW by faculty in different colleges ($F=3.4$, $P<.01$) (see table 6).

Table(6) Results of one way ANOVA of the differences in the patterns of use of the Internet and the WWW among faculty from different colleges.

Source	df	SS	MS	F	P
Between Groups	12	683.20	56.9	3.4	.0001
Within Groups	192	3199.65	16.7	-	-
Total	204	3882.8	-	-	-

To determine the source of difference, a scheffe test was used; the results indicate that no significant differences were found among colleges at the .05 level of significance.

-Results of one way ANOVA indicate that there were no significant differences in the patterns of use of the Internet and the WWW among faculty from different academic ranks ($F=.2118$, $P>.05$).

-Results of one way ANOVA indicate that there were no significant differences in the patterns of use of the Internet and the WWW among faculty with different teaching experiences ($F=.3969$, $P>.05$)

-Results of one way ANOVA indicate that there were significant differences in the patterns of use of the Internet and the WWW among faculty from different ages at the .05 level of significance (see table 7).

Table (7) Results of one way ANOVA for age.

Source	df	SS	MS	F	P
Between Groups	3	146.88	48.96	2.6	.0510
Within Groups	201	3735.97	18.59	-	-
Total	204	3882.85	-	-	-

To determine the source of difference, a scheffe test was used; the results indicate that there were no significant differences among ages' categories at the .05 level of significance.

-Results of t-test indicate that there were no significant differences in the patterns of use of the Internet and the WWW between Saudi and non-Saudi faculty (F=2.25, P>.05).

-Results of t-test indicate that there were significant differences in the patterns of use of the Internet and the WWW between faculty with previous Internet training and faculty with no training at the .01 level of significance (See table 8); meaning that faculty with previous training in the Internet spent significantly more weekly hours using the Internet and the WWW in the four patterns of use.

Table(8) Results of t-test of the differences in the patterns of use of the Internet and the WWW between faculty with previous training and faculty with no training.

Variable	n	M	SD	df	t-test	P
Previous Training	186	7.41	4.11	203	5.63	000
No Training	19	1.89	3.6	-	-	-

Question 5: Are there significant differences in the levels of use of the WWW for teaching purposes among faculty from different colleges, ages, nationality, academic ranks, teaching experiences, and training?

One way ANOVA and t-test were used where appropriate to analyze data related to this question. Results were as follows:

-Results of one way ANOVA indicate that there were significant differences in the levels of use of the WWW for teaching purposes among faculty from different colleges at the .01 level of significance (See table 9).

Table (9) Results of One Way ANOVA of the differences in the levels of use of the WWW among faculty from different colleges.

Source	df	SS	MS	F	P
Between	12	27.15	2.26	2.56	.0035
Within	191	168.27	.8810	-	-
Total	203	195.42	-	-	-

A scheffe test was used to determine the source of differences; the results indicate that there was significant difference between the college of pharmacy (Mean = 3.3) and the College of Education (Mean =1.6) at .01 level of significance; meaning that the pharmacy faculty used the WWW for teaching purposes at a more advanced level than Education faculty.

-Results of one way ANOVA indicate that there were no significant differences in the levels of use of WWW for teaching purposes by faculty with different ages ($F=.2537$, $P> .05$), and different academic ranks ($F=.0385$, $P>.05$), and different years of teaching experience ($F=. 2849$, $P>.05$).

-Results of t-test indicate that there was no significant mean difference in the levels of use of the WWW for teaching purposes by Saudis and Non-Saudis faculty members ($F=.095$, $P>.05$).

-Results of t-test indicate that there was significant mean differences in the levels of use of the WWW for teaching purposes among faculty with previous Internet training and faculty with no such training at the .01 level of significance (See table 10).

Table (10) Results of t-test of the differences in the levels of use of the WWW among the faculty with / without training.

Variable	N	M	SD	df	t-value	P
Previous Training	185	2.20	.967	202	3.40	.001
No Training	19	1.42	.838	--	--	--

Question 6: Are there significant differences in perceived relative importance of the conditions of innovation adoption among faculty members with different levels of use of the WWW?

One way ANOVA was used to determine whether or not faculty using the WWW at different levels hold different perceptions of the relative importance of the conditions of innovation adoption. As table 11 shows, there were no significant differences ($F=1.4191$, $P>.05$) in perceived importance of these conditions among faculty with different levels of use of the WWW.

Table (11) one way ANOVA of perceived relative importance of conditions of innovation adoption.

Source	df	SS	MS	F	P
Between Groups	5	77.45	15.49	1.41	.2189
Within Groups	198	2161.53	10.91	-	-
Total	203	2238.99	-	-	-

Question 7: Are there significant differences in the patterns of use of the Internet and the WWW and in the levels of use by faculty in the science colleges and faculty in the human science colleges?

-Results of t-test indicate that there was significant mean difference in the patterns of use of the Internet and the WWW between sciences faculty and human sciences faculty at the .001 level of significance (see table 12); meaning that faculty in science colleges spent significantly more average weekly hours using the Internet and the WWW in the four patterns than their colleagues at the human science colleges.

Table (12) Results of t-test of the differences in the patterns of use of the Internet and the WWW between sciences and human sciences colleges.

Variable	n	M	S	df	t-valuse	P
Science Faculty	118	7.77	3.95	203	3.43	.001
Human Science Faculty	87	5.7	4.63	--	--	--

-Results of t-test indicate that there was significant mean difference in the levels of use of the WWW for teaching purposes between sciences faculty and human science faculty at the .05 level of significane (see table 13), meaning that faculty in science college used the WWW for teaching purposes significantly at more advanced level than their colleagues in human science colleges.

Table (13) Results of t-test of the differences in the levels of use of the WWW between science and human science faculty

Variable	n	M	S	df	t-valuse	P
Science Faculty	117	2.25	.993	202	2.11	.036
Human Science Faculty	87	1.96	.946	--	--	--

Discussion

The major purpose of the study was to identify the patterns and levels of use of the Internet and the WWW by faculty members at King Saud University, Riyadh Campus as well as their perception of the conditions that facilitate such use.

As the demographic information showed, faculty in the study received most of their training by being self-taught (79.5%), and from their colleagues (23.9%), with very little training provided by the university (8.8%) (See table 2). This is similar to that reported by Jaber and Moore (1999) who found that 80% of teachers survayed were self-taught and 86% had Peer's assistance in the use of computer-based technology.

-Patterns of use of the Internet and the WWW: of the four patterns: teaching, research, communication, and publication, results showed that using the Internet and the WWW for research purposes was the most prevailing pattern, with more than 50% used it three, four, or five hours weekly (see table 3). Using the Internet and the Web for teaching purposes was rather low, with more than 65% of faculty said they either never used the Internet and the Web in teaching or used it one hour per week. This results is not surprising, for teaching in the university is still in large part lecture dominant. Wang (1998) found similar results; faculty in his study used the Web and other tools more for research and communication than for teaching. Likewise, Weedman (1994) (Cited in Jaber and Moore, 1999) found that his target subjects used the mailing list most for research with teaching being the least. Figure 1, shows the means of using the four patterns, while figures 2 through 5 show the percentages of faculty using each pattern.

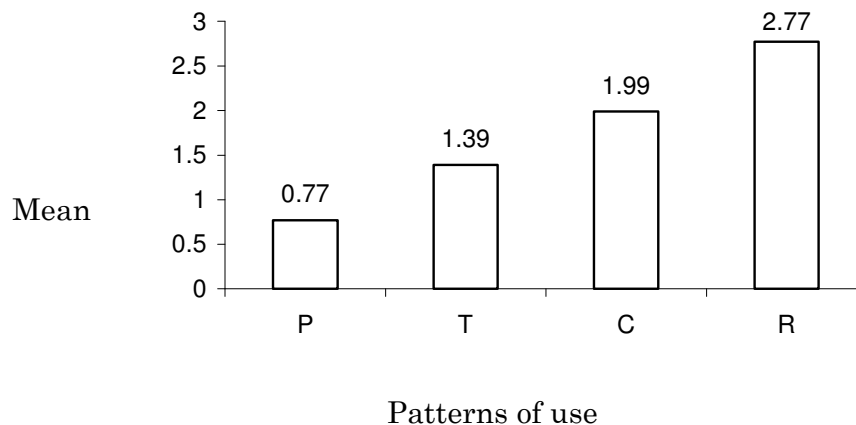
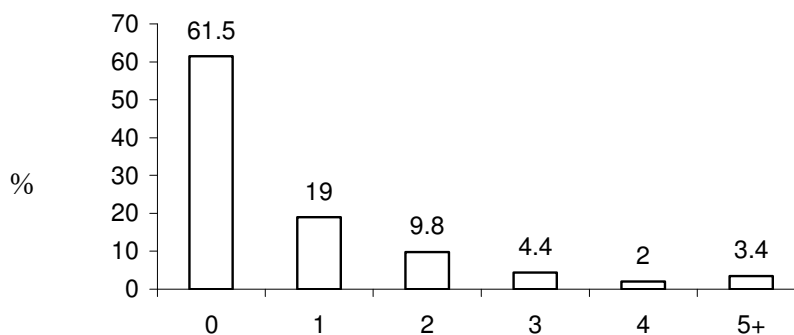
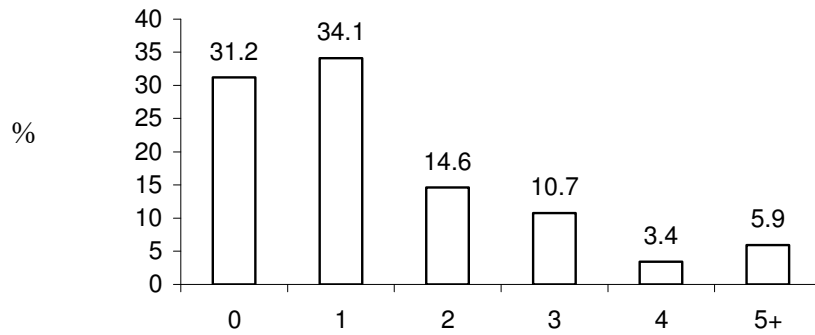


Figure 1. Patterns of use of the Internet and the WWW by faculty (P=Publication, T=Teaching, C=Communication, R=Research).



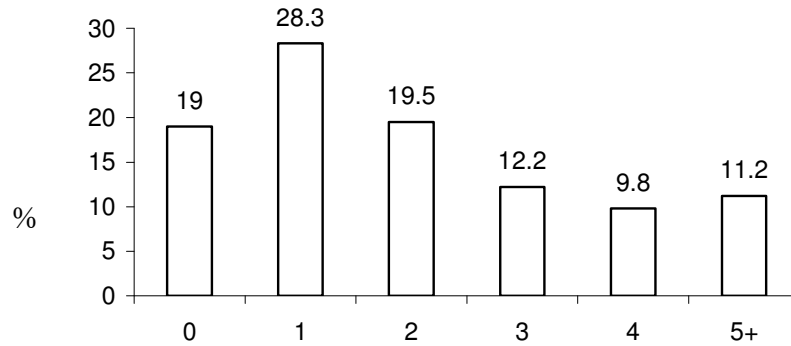
Average of Weekly Hours

Figure 2. Percentages of faculty using the Internet and the WWW for publication on an average weekly hours basis.



Average of Weekly Hours

Figure 3. Percentages of faculty using the Internet and the WWW for teaching purposes on an average weekly hours basis.



Average Weekly Hours

Figure 4. Percentages of faculty using the Internet and the WWW for communication on an average weekly hours basis.

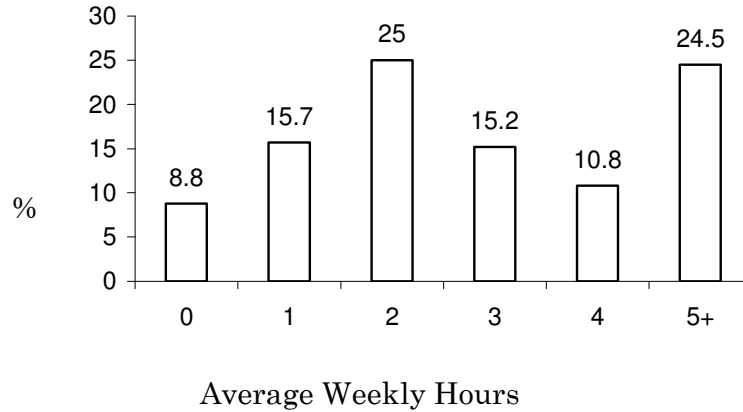
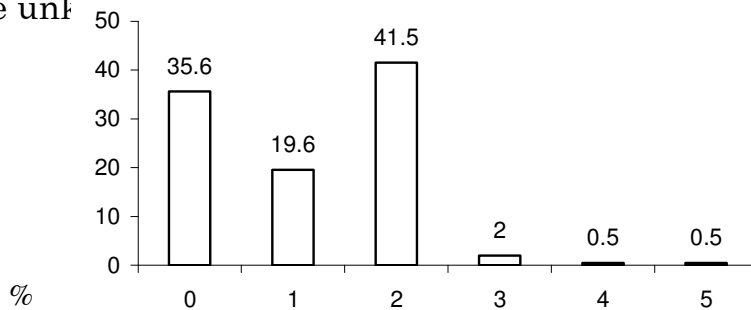


Figure 5. Percentages of faculty using the Internet and the WWW for research on an average weekly hours basis.

-Levels of using the WWW for teaching purposes:

Results showed that the supplemental level was the most prevailing level of use of the Web in teaching. This level means that faculty and students meet fact to face in lecture halls, but certain information (e.g. handouts is placed on faculty member's Web site that student refer to get some supportive information). However, this results should be taken with some cautions, because many faculty indicated that they pass materials taken from Websites to students in class, and not necessarily placing them on line in faculty URL. This means that Web use for teaching was rather low with 61% of faculty (See table 4 and figure 6) checked either information or supplemental level, and that more than one third of faculty never used the Web in teaching. Only four faculty members (2%) checked the essential level, meaning that teaching is still fact-to-face, but most course materials are placed on-line. Finally one faculty checked the communal and immersive levels (.5%). This result should be interpreted cautiously, because university teaching system requires face-to-face contact hours; it could be that these faculty misinterpreted the question or have certain special circumstances.

These results are similar to those reported by Al Mohaisen (2000) and Alamri (1993) who reported low computer use by faculty in Saudi Universities and colleges of education. Harmon and Jones (1999) indicate that the essential level of use of the Web is still fairly uncommon, while the communal level is beginning to receive widespread use, and the immersive level is still quite un-



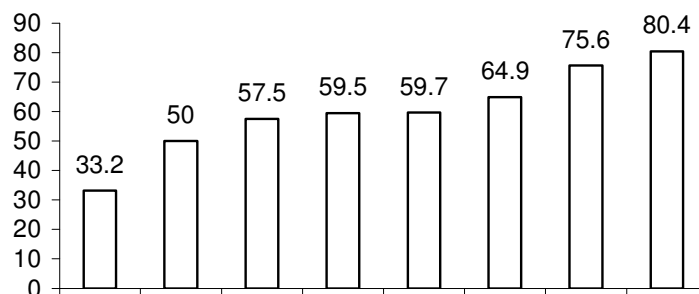
Levels of use of the WWW

Figure 6: Faculty levels of use of the WWW for teaching purposes (0=zero level, 1=Informational, 2=Supplemental, 3=Essential, 4=Communal, 5=Immersive).

-Perception of Ely's conditionn of innovation adoption:

Results showed that most faculty (n=205) considered most of Ely's eight conditions as very important in facilitating their use of the Internet in teaching (see table 5 and figure 7). Availability of resources ranked first as vary important (80.4%), followed by existence of knowledge and skills (75.6%), with other conditions considered as very important by more than 50% of faculty. Only participation which was considered as very important by 33.2% of faculty, a low Percentage compared to the other conditions. The reason may be attributed to the fact that decision making process concerning university wide enterprices such as computer infrastructure and services is top-down with limited or on opportunity for faculty involvement.

Results regarding Ely's conditions of change adoption support those reported in previous research (e.g.Ravits 1998, Ely 1999). Finally, results indicate that both users and non-users of the Internet and the Web highly valued these conditions.



%

Ely's Conditions

Figure 7: Percentages of faculty perceiving Ely's conditions as very important (P=Participation, D=Dissatisfaction with status quo, At=Availability of time, C=Commitment, R=Availability of incentives and rewards, L=Leadership, EK=Existence of Knowledge, AR=Availability of resources).

Results showed that college in which faculty work appear to have influence on the average weekly hours spent in using the Internet and the Web in the four patterns ($F=3.4164$, $P<.01$) (See table 6). however, scheffe test did not detect significant differences among colleges. This was also true to age.

Also, teaching experience, academic rank, and nationality did not have influence on patterns of use, results that are similar to those reported by Spotts and Bowman (1995) and Al Mohaisen (2000)

Finally, although types of training did not influence patterns of use, training in Internet vs no training influenced such use (see table 10); faculty with Internet training, spent significantly more average weekly hours in each pattern of use. Research has repeatedly supported the relationship between training and media utilization.

While results showed significant differences in the levels of use of the Web among faculty from different colleges, a scheffe test yielded significant differences between Pharmacy and Education faculty only, with more advanced level of use by pharmacy faculty. Age appeared to have influence on the level of use, however, a scheffe test did not detect any significant differences among age categories. Likewise, teaching experience,

academic rank, nationality, and type of training, did not have influence on level of use. Again Internet training vs no training has such influence; faculty with Internet training used the Web significantly at a more advanced level than those with no training.

Results also showed that there were no significant differences in perceived importance of conditions of innovation adoption among faculty with different levels of use of the Web for teaching. This result is attributed to the fact that most faculty (users and non-users) considered most of the conditions as very important in facilitating their use of the Web for teaching purposes (see table 5 and Figure 7).

Finally, results showed significant differences between faculty in science colleges and faculty in human science colleges; science faculty spent significantly more hours per week using the Internet and the Web than did human science faculty (see table 12). This result is similar to that reported by Al mohaisen (2000), who found science faculty more active users of computer than human science faculty.

Summary and Recommendations

Summary:

The study attempted to identify patterns and levels of use of the Internet and the WWW by faculty at King Saud

University, Riyadh Campus. Results showed that using the Internet and the Web for research purposes was the dominant pattern of use, and the supplemental level was the most prevailing level of use of the Web for teaching purpose. Variables such as years of teaching experience, age, academic rank and nationality were not factors in the use of the Internet and the Web. On the other hand, Science faculty spent significantly more hours per week using the Internet and the Web than did human science faculty, as did faculty with previous training than those with no such training. Most faculty perceived most of Ely's conditions of innovation adoption as very important.

Recommendations:

Based on the results of the study, the following recommendations are warranted:

1. Provision of strong commitment, administrative and leadership support to encourage technology based teaching and improvement of instructional approaches.
2. Provision of technical and instructional support at the college and department levels.
3. To be practical, one way that might encourage faculty use of the Internet tools and services for teaching purposes, is to consider distinguished teaching as an important criteria in faculty promotion system. Presently, faculty give little or no importance to enhanced teaching, and spend most of their time and effort on research as the shortest way for promotion.
4. Further research examining faculty use of IT as well as IT infrastructure and services at the university, college, and public schools levels might yield invaluable data for decision makers.

Appendix Questionnaire

First Section: Demographic Information:

- College
- Age : 30 40 50 61 or more
- Nationality Saudi Non-Saudi
- Teaching Experience 6 7-9 10 or more
- Academic Rank Assistant Associate Professor
- Training: None Self-taught
 Assistance
 Out side university training
 Inside university training
 Other-(specify)

Second Section: Patterns of using the Internet and the WWW.
Place an (x) in the appropriate space that describes your average hours per week using each pattern shown below:

Patterns of using the Internet & the WWW	Average Hours Per Week					
	0	1	2	3	4	5+
<u>Teaching:</u> Using the Internet & the Web to support teaching.						
<u>Research:</u> Generating research ideas and locating related literature.						
<u>Communication:</u> Communication with colleagues and professional organization for professional development.						
<u>Publication:</u> Publication of articles and research studies on the Internet.						

Third Section: Levels of use of the WWW in teaching: Chose one level that represents your current use of the WWW in teaching.

Levels of using the WWW in teaching	
<u>Zero Level</u> : Never use the Web in teaching	
<u>Informational Level</u> : using the Web as a resource by placing course syllabus on a Web site.	
<u>Supplemental Level</u> : using the Web as a supplemental support (e.g. placing lecture notes, handouts, etc) on a Web site.	
<u>Essential Level</u> : using the Web to replace the text book; teaching is face-to-face.	
<u>Communal Level</u> : Teaching fact-to-face and Web-based instruction.	
<u>Immersive Level</u> : Course content, assignments, interaction, and teaching is totally Web-based; No face-to-face contact.	

Section Four: Perception of conditions of innovation implementation: place an (x) in the appropriate space.

Conditions that facilitate the use of the Internet & the Web in teaching	Relative Importance		
	Very Important	Some what important	Not important
1. Formalating new policies to support Internet based teaching and learning			
2. Availability of knowledge and skills to use the Internet in teaching			
3. Availability of resources (e.g. technical support, equipment, etc).			
4. Availability of time ot utilize the Internet in teaching.			
5. Availability of incentives and rewards (e.g. relase time, promotion,			

etc.)			
6.Opportunities for faculty to participate in decision making process related to Internet use in teaching.			
7.University commitment to improve instructional approaches and support the use of the Internet for teaching purpose.			
8.Leadership support at the university, college, and department levels to use the Internet in teaching.			

References

Al-Amri, Abdullah (1993). Factors influencing the decision to use Micro computer by the faculty of King Saud University in Saudi Arabia. Unpublished Doctoral Dissertation.

Alessi, Stephen M. and Trollip, Stanley R. (2001). Multimedia for Learning. 3rd ed. Needham Height Massachusetts: Allyn & Bacon.

Al-Mohaisen, Ibrahim (2000). The status quo and Barriers of using computer at the colleges of education, in Saudi Universities. The Educational Journal, vol.15 (57), pp. 31-70 (in Arabic).

Buck, Hettie and Horton, Phillip (1996). Who's using what and how often: An Assessment of the use of Instructional Technology in the Classroom. Florida Journal of Edcational Research. Vol. 36(1), pp. 47-61.

Collis, Betty. (1996). Tele-Learning in a Digital World. New York: International Thomson Computer Press.

Cummings, Leslie, (1995). Educational Technology: A Faculty Resistance View. Educational Technology Review. No.4, pp.13-17.

Ely, Donald p. (1990) Conditions that facilitate the implementation of educational technology innovations. *Journal of Research on Computing in Education*, vol.23 (2), 298-305.

Ely, Donald P.(1999). *New Perspectives on the Implementation of Educational Technology innovations*. Paper presented at the annual AECT Convention, Houston, Texas.

Harmon, Stephen and Jones, Marshall (1999). *Planning and Implementing Web-Based Instruction: Tools for Decision Analysis*. AECT 21st Annual Proceedings, Kristin Sparks and Michael Siminson (eds.), Columbus, Ohio: RTS & Associates, Inc., pp. 423-428.

Jaber, William and Moore, David, (1999). A survey of Factors which Influence Teachers' use of Computer Based Technology. *International Journal of Instructional Media*. Vol: 26(3), pp. 252-265.

Jones, Marshall G., Harman, Steven W., and Lowther, Deborah (2002). *Integrating web-based Learning in an Educational System: A Framework for Implementation* . In: Robert A. Reiser and John V. Dempsey: *Trends and Issues in Instructional Design and Technology*. New Jersey: Pearson Education, Inc. Pp. 295-306.

Maddux, Cleborne D. (1996). *The State of the Art in Web-Based Learning*. *Computers in the schools*, Vol. 12(4) pp. 63-71.

Newby, Timothy, Stepich, Donald, Lehman, James, and Russell, James (2000). *Instructional Technology for Teaching and Learning* (2nd ed.). New Jersey Prentice –Hall, Inc.

Ravitz, Jason (1998). *Conditions that Facilitate Teachers, Internet Use in Schools with High Internet Connectivity: Preliminary Findings*. AECT 20th Annual Proceedings. Nancy J. Maushak, Charles Schlosser, and Thomas N. Liyod. (eds.) Ames, Iowa, pp.319-336: Iowa state university,

Reiser, Robert and Dempsey, John V. (2002), Trends and Issues in Instructional Design and Technology. New Jersey: Pearson Education, Inc.

Starr, Robbin and Milheim, William D. (1996). Educational uses of the Internet: An Exploratory Survey. Educational Technology. Vol. 36(5), pp. 19-27.

Spotts, Thomas and Bowman, Mary (1995). Faculty use of Instructional Technology in Higher Education. Educational technology, vol. xxxv(2).

Surry, Daniel W. and Ely, Donald p. (2002). Adoption, Implementation, and Institutionalization of Instructional Design and Technology. In: Reiser A. Robert and John V. Demsey (eds.): Trends and Issues in Instructional Design and Technology. New Jersey: Pearson Education, Inc. pp. 183-192.

Trilling, Bernie and Hood, Paul (1999). Learning, Technology, and Education Reform in the knowledge Age. Educational Technology, vol. 39(3), pp. 5-17.

Wang, Yu-mei (1998). University Use of the Internet. AECT 20th Annual Proceeding. Nancy J. Maushak, Charles Schlosser and Thomas N. Lloyd (eds). Ames, Iowa: Iowa State University, pp. 455-462.

Wilson, Brent and Ryder, Martin (1996). Affordances and Constraints of the Internet for learning and Instruction. AECT 18th Annual Proceedings, Michael R. Simonson, Meredith Hays, and Sara Hall. (eds.), Ames, Iowa: Iowa State University, pp. 642-654.