

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

Dr. Bader A. Al-Saleh

Department of Instructional Media & Technology
College of Education, King Saud University, Riyadh.

Abstract

The Internet in its powerful tool, the World Wide Web (WWW), is considered by many as a vehicle for 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 is to investigate current patterns and levels of use of the Internet and the WWW by faculty members at King Saud University, Riyadh Campus. Results indicate 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, Newbyt 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

Research Questions:

The Study attempts to answer the following questions:

- 1 - What are the most prevailing 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 preception 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 Campus. Thus, generalization of results is limited to this audience.

Procedures**Population**

The target population for this study is comprised of all faculty members at KSURC. As of April 14, 2001, there has been 1620 faculty

members at KSURC. The researcher got a computer printout list of the names of faculty members in each of the thirteen colleges in Riyadh Campus, from which the sample of the study is drawn.

Sample:

A sample of 20% (324 subjects, male and female) of the total number (1620) of faculty members was randomly selected. To secure a representative 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%; (Table 1).

Table: 1 Response Rate by College

College	F	%
Pharmacy	10	4.9
Architecture	10	4.9
Applied Sciences	9	4.0
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
Linguistics	5	2.4
Total	205	100

Instrumentation

The instrument used for this study is 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 consists of four sections (See Appendix). The first section includes demographic information. The second section deals with patterns of use of the Internet and the WWW, and comprises four statements pertaining to four patterns of use of the Internet and the WWW. These are: teaching, research, communication, and publication. The third section includes

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 includes 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 concise, each of these conditions is represented by a single statement.

Data 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 were 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 were busy, tired, and bored of answering many questionnaires from within and outside the university.

Data Analysis

A current version of the SPSS is used to analyse the data. T-test, one-way ANOVA, frequencies, and percentages are used in the analysis. Tables and figure are 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 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.

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

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 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 analysed 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: Alpha = .71, and section four: Alpha = .89.

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 & Dempsey, 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 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, constructivist 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 serves 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 pur-

poses. 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 sciences faculty.

Al-Amiri (1993) studied factors influencing the use of microcomputer by faculty at King Saud University. Results indicated that faculty did not use microcomputers, unless there 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 showed that 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 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 unspecified.
- 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 via 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
Colleagues 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 prevailing 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 pattern(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
Communcation	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 and Jone (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, somewhat 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	11.0
7.Commitment	120	59.7	77	37.6	4	2.0
8.leadership	131	64.9	65	32.2	6	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 age 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 analyse 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 ($t = .095$, $P > .05$).
- 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-value	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 significance (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-value	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 surveyed 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 result 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.

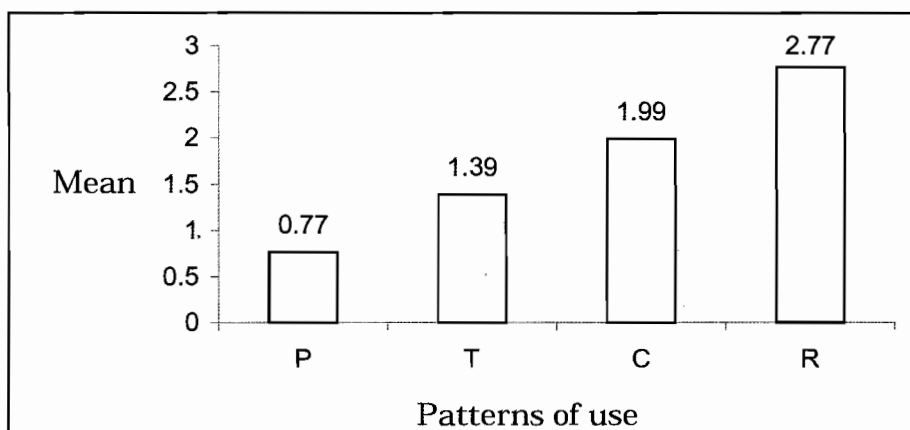


Figure 1. Patterns of use of the Internet and the WWW by faculty
(P= Publication, T= Teaching, C= Communication, R= Research)

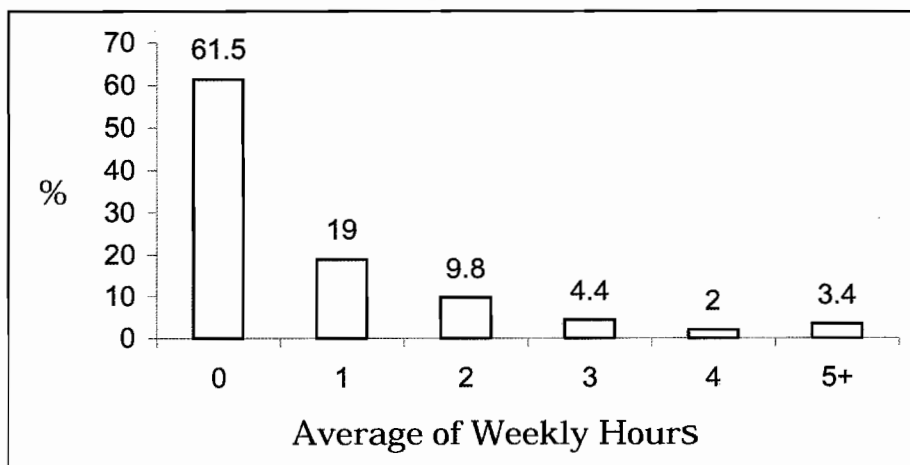


Figure 2. Percentages of faculty using the Internet and the WWW
for publication on an average weekly hours basis

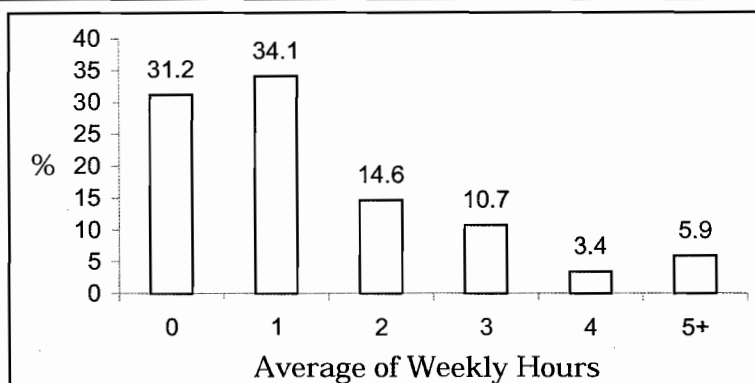


Figure 3. Percentages of faculty using the Internet and the WWW for teaching purposes on an average weekly hours basis

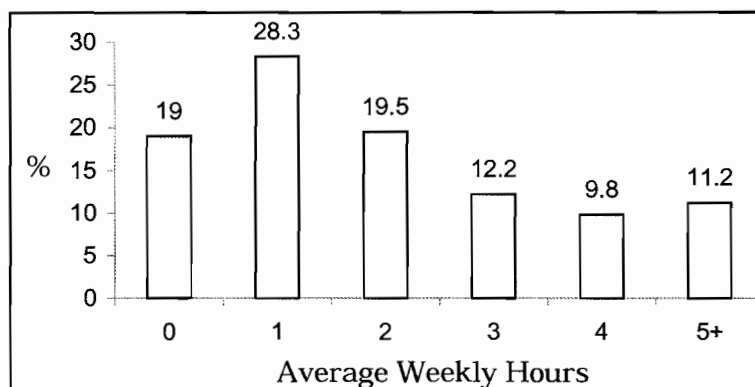


Figure 4. Percentages of faculty using the Internet and the WWW for communication on an average weekly hours basis

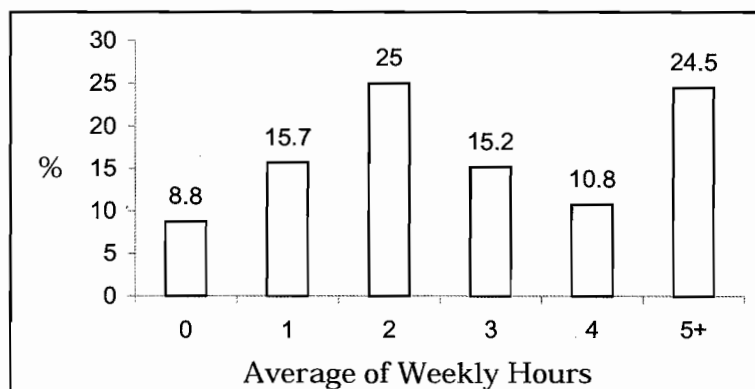


Figure 5. Percentages of faculty using the Internet and the WWW for research on an average weekly hours basis

Levels of using the WWW for teaching purposes:

Results showed that the supplemental level is the most prevailing level of use of the Web in teaching. This level means that faculty and students meet face 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 result should be taken with some caution, 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 for 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 face-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 unknown today.

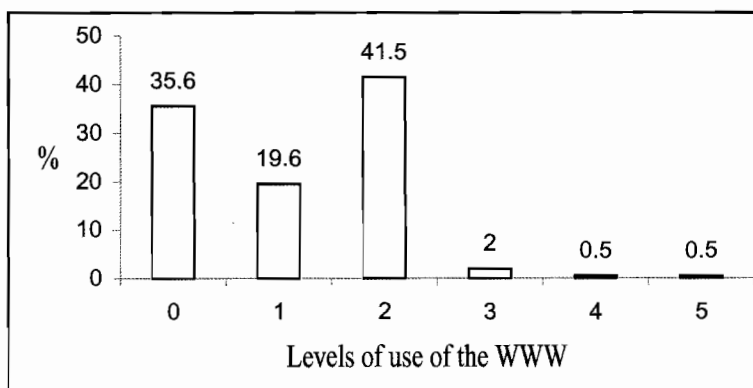


Figure 6. Faculty levels of use of the WWW for teaching purposes (0 = Zero level, 1 = Informational, 2 = Supplemental, 3 = Essential, 4 = Communal, 5 = Immersive)

Perception of Ely's condition of innovation adoption:

Results showed that most faculty ($n = 205$) consider 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 very 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 enterprises such as computer infrastructure and services is top-down with limited or no 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.

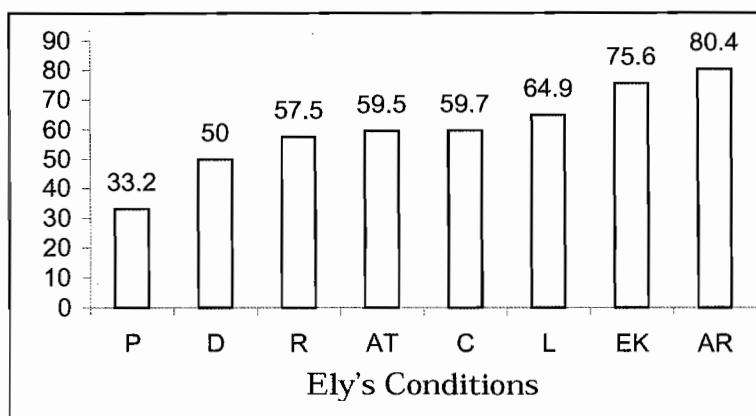


Figure 7: Percentages of faculty perceiving Ely's conditions as very important (P= Participation, D= Dissatisfaction with status quo, At= Availability of time, C= Commitment, R= Availability of incentives and rewards. L= Leadership, EK= Existence of knowledge, AR= Availability of resources).

Results showed that college in which faculty work appears 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 attempts 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 is the dominant pattern of use, and the supplemental

level is 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 warrant:

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.

أنماط ومستويات استخدام الإنترنت بوساطة أعضاء هيئة التدريس بجامعة الملك سعود بالرياض

د. بدر عبدالله الصالح

قسم وسائل وتكنولوجيا التعليم - كلية التربية، جامعة الملك سعود

الملخص

تعتبر الشبكة الحاسوبية العالمية (الإنترنت) وأداتها الفائقة (الشبكة العنكبوتية العالمية - WWW)، وسيلة لإحداث التحول في التعليم وطرق التدريس. ومع ذلك لا يتوافر سوى أبحاث قليلة تتناول الحالة الراهنة لاستخدام الإنترنت في التعليم عموماً وفي التعليم العالي على وجه الخصوص. لهذا، فالحاجة قائمة لتطوير التطبيقات الحالية للإنترنت على المستوى الجامعي. هدفت هذه الدراسة إلى استقصاء الأنماط والمستويات الحالية لاستخدام الإنترنت والشبكة العنكبوتية بوساطة أعضاء هيئة التدريس في جامعة الملك سعود بالرياض. وقد بينت النتائج أن مستوى استخدام الإنترنت وصفحات الويب بوساطة أعضاء هيئة التدريس يتراوح بين المنخفض والمتوسط، وكان المستوى التكميلي (Supplemental) لاستخدام الإنترنت هو الأكثر شيوعاً.

ومن بين الأنماط الأربعة لاستخدام الإنترنت والشبكة العنكبوتية (التدريس والبحث والاتصال والنشر)، بينت النتائج أن استخدامهما في البحث كان أكثر هذه الأنماط شيوعاً بين أعضاء هيئة التدريس. واعتبر أغلب أعضاء هيئة التدريس أغلب شروط إيلي (Ely) الثمانية لتبني التجديد مهمة جداً لتيسير وتشجيع استخدام الإنترنت في التعليم.

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Appendix

Questionnaire

First Section: Demographic Information:

- College
- Age : ☐ 30-40 ☐ 41-50 ☐ 51-60 ☐ 61 or more
- Nationality: ☐ Saudi ☐ Non-Saudi
- Teaching Experience:
 - ☐ 1-3 ☐ 4-6 ☐ 7-9 ☐ 10 or more
- Academic Rank: ☐ Assistant ☐ Associate
☐ Professor
- Training: ☐ None ☐ Self-taught
☐ Assistance
☐ Outside 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+
Teaching: Using the Internet & the Web to support teaching.						
Research: Generating research ideas and locating related literature.						
Communication: Communication with colleagues and professional organization for professional development.						
Publication: Publication of articles and research studies on the Internet.						

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

Levels of using the WWW in teaching	
Zero Level: Never use the Web in teaching	
Informational Level: using the Web as a resource by placing course syllabus on a Web site.	
Supplemental Level: using the Web as a supplemental support (e.g. placing lecture notes, handouts, etc) on a Web site.	
Essential Level: using the Web to replace the text book; teaching is face-to-face.	
Communal Level: Teaching face-to-face and Web-based instruction.	
Immersive Level: 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	Somewhat important	Not important
1. Formulating 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 to utilize the Internet in teaching.			
5. Availability of incentives and rewards (e.g. release 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.			

