Faculty perceptions of attributes affecting the diffusion of online learning in Saudi Arabia: A quantitative study

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Abstract

The application of Information and Communication Technologies (ITCs) in education can result in an enhancement of the delivery of educational services provided by universities. However, the success of such online education initiatives depends critically on a core resource, namely the cooperation and full participation of faculty members who deliver quality instruction. In 2000, King Saud University (KSU) in Saudi Arabia launched its online education initiative. This study uses the theory of innovation diffusion and standard survey designs to investigate KSU faculty members' perceptions about key attributes of online teaching, and their overall attitude toward this innovative form of teaching. The study also analyzes the relationship between, on one hand, a faculty member's background and personal characteristics and, on the other, their perceptions regarding the above attributes of online teaching. Finally, the study examines the link between such faculty perceptions and their overall attitude toward online teaching. A sample of 20 KSU faculty members participated in our quantitative survey. Analyses of variance (ANOVA) conducted with the collected data suggest that a given faculty member's professional area (or discipline), gender, and prior experience with online teaching have some influence over his or her ratings of this form of teaching, in terms of several key attributes. Correlation coefficients indicate significant and positive association between such faculty ratings and their attitude toward adopting online education. The paper explores some implications of the main findings.

1 Introduction

1.1 Statement of research issue

The internet and its allied technologies offer a significant opportunity for educational institutions, especially universities, to provide high quality education services at lower costs and with greater convenience for students. However, there is a risk that this opportunity may not be realized if faculty members are not inclined to adopt the relevant information and communication technologies (ICT). Indeed, faculty acceptance (or non-acceptance) of online learning and teaching has been cited by many researchers as a vital factor in the successful diffusion of the online approach to learning and teaching (Almekhlafi, 2005, Bower, 2001, Dolloph, 2007, Lindner et al., 2002, Maguire, 2005). According to Tabata and Johnsrud (2007), "faculty are a critical and core resource to the success of any distance education initiative and facilitating understanding of university educators and policy makers as to the conditions that encourage or discourage faculty participation may assist in sustaining academic quality and integrity" (p. 262).

Previous research on faculty perception and attitude toward online distance learning has focused on two main topics. A number of studies have focused on the *barriers* to acceptance as perceived by faculty members (Ellis, 2000, Maguire, 2005, Pajo and Wallace, 2001). Others have adopted a more general approach, in that they sought to

identify factors that affect, *both positively and negatively*, faculty perception and attitude toward online learning (Lindner et al., 2002).

Earlier studies in this area have been carried out in a range of countries, including the USA (Ellis, 2000), China (Li, 2004) and Ghana (Yakah, 2005). Saudi Arabia, where rapid modernization and adoption of latest technologies are taking place within a traditionally conservative society, offers an interesting case study in terms of possible contrasts as well as similarities with findings previously obtained elsewhere. There have been a number of studies of faculty perception in Saudi Arabia of online learning (Almobarraz, 2007, AL-Arfaj, 2001, AL-Augab, 2007, AL-Balawi, 2007). However, to our knowledge, there has been no comprehensive study that investigates, in a Saudi Arabian context, the relationship between faculty personal characteristics and their perception of, and attitude toward, online learning.

1.2 Purpose of study and key research questions

The purpose of this study is to examine the relationship between the personal characteristics (age, gender, level of education, teaching experience) of faculty members of a major Saudi Arabian university (King Saud University) and their perceptions of online learning attributes, and between such perceptions and attitudes toward online learning. Specifically, the study addresses four research questions:

1- How do faculty members of King Saud University (KSU) perceive key attributes of online teaching?
2- What is the attitude of faculty members toward online teaching?
3- What is the relationship between faculty members' personal characteristics and their perceptions of online teaching attributes?
4- What is the relationship between faculty members' perceptions of online teaching attributes and their attitude toward online teaching?

2 Theoretical framework and background

2.1 Theoretical frame work

The theoretical framework supporting this study is the theory of diffusion of innovation. Rogers (2003) defined an innovation as an idea, practice, or object that is perceived by an individual as new. He described diffusion as the process in which an innovation is spread over time through certain channels among the members of a social system. Conceptually, he saw each individual member as passing through five stages of the innovation-decision process, namely:

1- Knowledge stage: where an individual is exposed to the existence of an innovation and gains some understanding of how the new innovation works.
2- Persuasion stage: where the individual starts to form a favorable or unfavorable attitude toward the innovation based on perceived characteristics of the innovation.
3- Decision stage: where the individual becomes involved in activities that lead to a choice to accept or reject the innovation.
4- Implementation stage: where the individual puts the innovation into use.
5- Confirmation stage: where the individual seeks reinforcement of the innovation decision already made in the decision stage, or reverses the previous decision to adopt or reject if he or she is exposed to conflicting messages about the innovation.

Roger (2003) also identified five attributes, or characteristics, that affect the diffusion of an innovation: relative advantage, compatibility, complexity, trialability, and observability.

1- Relative advantage is the degree to which an innovation is perceived to be better than the alternatives.

2- Compatibility is the degree to which an innovation is viewed as consistent with existing values, past practices, and experiences of the adopters.
3- Complexity is the degree to which an innovation is seen as difficult or hard to understand and use.
4- Trialability is "the degree to which an innovation may be experimented with on a limited basis" (Rogers, 2003). Typically the rate of adoption of an innovation is positively associated with its degree of trialability.
5- Observability is "the degree to which the results of an innovation are visible to others" (Rogers, 2003). Again, the rate of adoption is expected to be positively associated with the observability of an innovation's effects.

2.2 Existing research

Lindner et al (2002) conducted a quantitative study to explore the factors that affect faculty perceptions of technologically mediated instruction. They reported an inverse relationship between tenure and academic rank/position on one hand and, on the other, the use of online distance education. They linked this finding with the fact that newer faculty members tend to be more familiar and have greater skills with recent technologies and, therefore, are more comfortable to use technology in the classroom.

Tabata & Johnsrud (2007) employed quantitative methods and diffusion of innovation theory to explore factors affecting faculty perception of online teaching, and adoption of innovations, at a ten-campus system of public, postsecondary institutions. Their findings suggest that faculty participation in online learning depends on faculty skills in using technologies, available training and assessment for faculty, and appropriate course design.

Dolloph (2007) conducted a qualitative study to investigate faculty perceptions of online distance courses . The results suggest that a faculty member's previous experience with distance learning, as well as the availability of technical support, affect his or her perceptions toward online education.

Li (2004) carried out a quantitative study based on the responses of 273 faculty members in China. The results tend to support the conceptualization of online learning in terms of the five attributes mentioned above (relative advantage, compatibility, complexity, trialability, and observability). Interestingly, they also suggest that previous teaching experience had no significant influence on these five attributes except compatibility.

AL-Augab (2007) conducted a quantitative study similar to that of Li (2004) in order to examine the attitudes of *female* faculty and students toward online learning in Saudi Arabia. The results indicate that faculty and student have positive attitudes toward online learning, and that previous experience with using technology in education is not considered essential or important.

Similarly, AL-Balawi (2007) conducted a quantitative study to investigate factors relating to the implementation of online learning at three universities in Saudi Arabia. He found that faculty there had generally positive attitude toward online learning.

3 Methods

3.1 Survey: a quantitative approach to research issue

As its title indicates, this study adopts a quantitative approach. Bryman (2004) suggests that quantitative methods represent "… a deductive approach to the relationship between theory and research, in which the accent is placed on testing theories …" (p. 19). An important step in this testing process is the collection of numerical data (Muijs, 2004, p. 2). Since research into online education in Saudi Arabia is still at an early stage, collecting

multiple sets of relevant numerical data is, at present, an essential step toward a more complete understanding of the processes and issues involved. It is expected that future research will build on the present study by gathering both quantitative and qualitative information.

For this study, closed (rather than open-ended) questions were used. Closed questions allow data to be collected relatively quickly and flexibly (e.g., via mail surveys). Further, the collected data (in standard forms) can then be processed in a relatively straightforward manner (De Vaus, 2002, Dillman, 2000, Sekaran, 2003).

This study uses a questionnaire instrument to collect quantitative data relating to (i) faculty perceptions about five attributes of online teaching (*relative advantage, compatibility, complexity, trialability, and observability*); (ii) faculty personal characteristics, namely age, gender, level of education, teaching experience, professional area, and online teaching experience; and (iii) faculty attitudes toward online teaching.

3.2 Survey sample and instrument

First established in 1957, King Saud University (KSU) is located in Riyadh and is the oldest and largest of Saudi Arabia's universities**.** In 2000, KSU began to utilize internet capabilities in delivery of educational services. In the academic year 2005/2006 there were 3136 faculty members at KSU, including academic staff, lecturers, demonstrators and teachers (KingSaudUniversity, 2008).

The survey population is defined to include all KSU staff members who teach students in any course at the university. The sample size was 20 of those faculty members. The participants agreed to participate in the study on a voluntary basis and to share their professional experience through the questionnaire instrument.

The study instrument consists of three sections. (The complete instrument is available from the authors.) The first section seeks to elicit personal characteristics of the responding faculty member: experience in teaching online courses, college affiliation, gender, age, and general teaching experience. The second section measures the respondent's perceptions about five online teaching attributes: relative advantage, compatibility, complexity, trialability, and observability. A five-point Likert scale is used, with 1=Strongly Disagree (SD); 2=Disagree (D); 3=Neutral (N); 4=Agree (A); and 5=Strongly Agree (SA). The questions in the second section are adapted from (Li, 2004). The third section asks the respondent to indicate their attitude toward teaching online courses. A five-point scale is again used. The questions in the third section are adapted from Mishra and Panda (MISHRA and PANDA, 2007).

3.3 Data collection, reliability and validity

Data were collected through personally delivered survey questionnaire forms. Starting from October 10, 2008, these questionnaires, together with consent forms (also available from the authors), were distributed to 20 associates of the authors. All of these associates were KSU faculty members. They were asked to fill in their questionnaire form in their spare time and one of the authors collected the forms after they were completed. All potential participants were informed that their participation is completely voluntary. Data collection ceased on October 20, 2008. A response rate of 100% (n=20) was obtained.

According to Creswell (2008), in quantitative survey research an instrument is reliable if the scores obtained from it are "stable and consistent" (p. 169) – that is, when it is administered a number of times, the scores obtained should not differ from each other too much or haphazardly. A standard reliability statistic, namely Cronbach's Alpha, is used to test the reliability of the data obtained. In the present case, the statistic was r = 0.848 with respect to faculty perception about attributes of online teaching, and r = 0.978 with respect to

faculty attitude toward online teaching. Both of these suggest that the data are reasonably reliable.

Golafshani (2003) defines validity in quantitative research in terms of "whether the research truly measures that which it was intended to measure or how truthful the research results are". The validity of a finding is often assessed by means of consistency with other findings in the same study, or with findings by previous researchers asking a series of questions, and will often look for the answers in the research of others. (p. 599). Such validity checks are included in our analysis below.

3.4 Overview of methods of analysis

The collected data were analyzed with the use of the Statistical Package for Social Sciences (SPSS, 16.0). The analysis has five specific objectives:

Objective 1

The first objective is to obtain an understanding of the background of the responding faculty members, in terms of a number of personal characteristics, including gender, age, level of education, general teaching experience, and online teaching experience. Responses were used to calculate frequencies and distributions.

Objective 2

This objective relates directly to Research Question 1: to obtain measures of faculty perception with respect to key attributes of online learning. These attributes include: relative advantage, compatibility, complexity, trialability, and observability. Responses were recorded as SPSS scale variables, which were then used in further analysis.

Objective 3

This objective relates directly to Research Question 2: to gauge faculty attitude toward teaching online courses. Faculty members' responses were recorded as values of an SPSS scale variable, which were then used in further analysis.

Objective 4

This objective relates directly to Research Question 3: to examine the relationship between the personal characteristics of a respondent and his or her perceptions regarding the attributes of online education. Analysis of variance (ANOVA) was conducted with the use of SPSS.

Objective 5

This objective relates directly to Research Question 4: to examine the relationship between a respondent's perceptions regarding the attributes of online education and his or her attitude toward this form of education. Using SPSS, Pearson's correlation coefficient was calculated to determine the extent of association between faculty perceptions and faculty attitude toward online teaching.

4 Results

4.1 Background/personal characteristics of respondents

Gender

Table 1 shows the distribution of faculty participants *(N=20*) by gender. Twelve participants (60%) were male and eight participants (40%) were female.

Table 1: Distribution of Participating KSU Faculty by Gender (N=20)

Gender	Frequency	Percent
Male	12	60.0
Female	8	40.0
Total	20	100.0

Age

Table 2 shows the distribution of participating faculty (*N= 20*) by age. One participant (5%) was under the age of 26; six (30%) were in the 26-30 age group; six were (30%) were in the 31-35 group; four (20%) in the 36-40 group; two (20%) in the 41-45 group; and one (5%) was over the age of 46. The youngest faculty member was 25 years old and the oldest was 48. The average age of participants was approximately 34 years.

Table 2: Distribution of Participating KSU Faculty by Age (N=20)

Age Group	Frequency	Percent
< 26	1	5.0
26-30	6	30.0
31-35	6	30.0
36-40	4	20.0
41-45	2	10.0
46-50	1	5.0
Total	20	100.0

Level of Education

Table 3 provides the distribution of the sample by the highest level of education achieved by each respondent. Six participants (30%) had a bachelor degree; twelve (60%) had a master degree; and two (10%) had a doctoral degree.

Table 3: Distribution of Participating KSU Faculty by Level of Education (N=20)

Degree	Frequency	Percent
Bachelor	6	30.0
Master	12	60.0
Doctoral	2	10.0
Total	20	100.0

Professional Area

Table 4 shows the distribution by professional area, which is indicated by the relevant college. Participants were associated with five different colleges. Of these participants, 8 (40%) were from the education college, 4 (20%) from engineering, 4 (20%) from business, 2 (10%) from computer science, and 2 (10%) from the science college.

Table 4: Distribution of Participating KSU Faculty by Professional Area (N=20)

College	Frequency	Percent
Computer Science	2	10.0
Education	8	40.0
Business	4	20.0
Science	2	10.0
Engineering	4	20.0
Total	20	100.0

General teaching experience

Table 5 provides the distribution by general teaching experience. Six participants (30%) had less than two years of teaching experience. Seven (35%) had between 3-6 years, two (10%) had between 7-9 years, three (15%) had between 10-12 years, one (5%) had between 13-15 years, and one (5%) had between 16-18 years of teaching experience.

Table 5: Distribution of Participating KSU Faculty by Teaching Experience (N=20)

Teaching Experience	Frequency	Percent
< 2	6	30.0
3-6	7	35.0
7-9	2	10.0
10-12	3	15.0
13-15	1	5.0
16-18	1	5.0
Total	20	100.0

Online teaching experience

Table 6 shows the distribution of participating KSU faculty (N=20) by their online teaching experience. Fifteen participants (75%) had some online teaching experience and five participants (25%) had no such experience.

Table 6: Distribution of Participating KSU Faculty by Online Teaching Experience (N=20)

Online Teaching Experience	Frequency	Percent
Have online teaching experience	15	75.0
Have no online teaching experience	5	25.0
Total	20	100.0

4.2 Perceptions regarding key attributes of online teaching

4.2.1 Perceived relative advantage of online teaching

Faculty perceptions regarding the relative advantage of online teaching were measured by participants' responses ("strongly disagree" to "strongly agree") to four statements about this potential advantage. Absolute and relative frequencies were used to describe the results. Table 7 shows the distribution of KSU faculty perceptions about relative advantage of online teaching. On a scale of 1 to 5, where 5 is "strongly agree", the overall mean for responses to these statements was *M* = 4.062 with a standard deviation of *SD* = 0.972, indicating that the respondents tended to agree with the general proposition that online teaching possesses certain advantages relative to conventional teaching.

Table 7: Distribution of Participating KSU Faculty by Their Perceptions about Relative of Online Teaching

		Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	
Statement	***N***	***f***	***%***	***f***	***%***	***f***	***%***	***f***	***%***	***f***	***%***
Using Web-based educational technologies could reach more students	20	0	0	1	5	3	15	8	40	8	40
Using Web-based educational technologies could provide more scheduling flexibility and save time	20	3	15	0	0	2	10	6	30	9	45
Using Web-based educational technologies could give me access to more teaching resources	20	1	5	1	5	0	0	8	40	10	50
Web-based educational technologies could be provided economically	20	1	5	1	5	3	15	8	40	7	35

4.2.2 Perceived compatibility of online learning

Perceptions regarding the compatibility of online learning (with the participant's prior beliefs and values) were measured by participants' responses to four statements. Table 8 shows the results. The overall mean for all responses to these statements was *M* = 3.55 with a standard deviation of *SD* = 1.182, indicating a perceived level (or rating) of compatibility which is half way between "neutral" and "agree", and which is clearly lower than the mean rating for the "relative advantage" attribute (analyzed above).

Table 8: Distribution of Participating KSU Faculty by Their Perceptions about compatibility of Online Teaching

		Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	
Statement	***N***	***f***	***%***	***f***	***%***	***f***	***%***	***f***	***%***	***f***	***%***
Web-based educational technologies are available to me	20	1	5	2	10	5	25	6	30	6	30
Using Web-based educational technologies are acceptable to me	20	1	5	3	15	3	15	5	25	8	40
Procedures used in Web-based educational technologies would fit well with my teaching conditions	20	2	10	2	10	7	35	3	15	6	30
Web-based educational technologies are available to students	20	1	5	9	45	1	5	2	10	7	35

4.2.3 Perceived complexity of online learning

Perceptions regarding the complexity of online learning were measured by participants' responses to four statements. The scale used to measure perceived complexity is a reverse scale, i.e. the higher the score, the less complexity is perceived. Table 9 shows the results. The overall mean for responses to these four statements was *M* = 3.5 with a standard deviation of *SD* = 0.866, indicating a favorability rating similar to that for "compatibility" but lower than for "relative advantage".

Table 9: Distribution of Participating KSU Faculty by Their Perceptions about complexity of Online Teaching

		Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	
Statement	***N***	***f***	***%***	***f***	***%***	***f***	***%***	***f***	***%***	***f***	***%***
Web-based educational technologies are readily available to faculty	20	0	0	6	30	2	10	7	35	5	25
Web-based educational technologies are easy to use.	20	1	5	2	10	3	15	9	45	5	25
The changes in teaching methodology necessary to use Web-based educational technologies are easy to understand.	20	0	0	6	30	5	25	6	30	3	15
The changes in teaching methodology necessary to use Web-based educational technologies will be easy for me to implement.	20	0	0	6	30	3	15	8	40	3	15

4.2.4 Perceived trialability of online learning

Perceptions regarding the trialability of online learning were measured by participants' responses to four statements about such trialability. Table 10 shows the relevant results.

The overall mean for responses to these statements was *M* = 3.65 with a standard deviation of *SD* = 0.943, indicating a favorability rating higher than for "compatibility" and "complexity" but still below that of "relative advantage".

Table 10: Distribution of Participating KSU Faculty by Their Perceptions about trialability of Online Teaching

		Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	
Statement	***N***	***f***	***%***	***f***	***%***	***f***	***%***	***f***	***%***	***f***	***%***
It is possible for me to deliver selected portions of a course (a single lesson or unit) using Web-based educational technologies prior to developing an entire course.	20	1	5	2	10	6	30	8	40	3	15
It is currently possible for me to incorporate selected teaching materials (e.g., readings, assignments, references) on the Web in support of my classes.	20	0	0	3	15	2	10	9	45	6	30
It is currently possible for me to accomplish some teaching functions (e.g., reporting grades, communication with students, demonstrations, identify sources and references) on the Web.	20	0	0	5	25	1	5	8	40	6	30
It is possible for students to use Web-based educational technologies (e.g., Accessing the Internet, downloading and uploading materials, watching video lessons, chatting on-line, etc.)	20	0	0	7	35	3	15	4	20	6	30

4.2.5 Perceived observability of online learning

Perceptions regarding the observability of the effects of online learning were measured by participants' responses to four statements about such observability; see Table 11. The overall mean for responses to these statements was *M* = 4.13 with a standard deviation of *SD* = 0.614. This represents the highest favorability rating for any of the five nominated attributes of online education.

Table 11: Distribution of Participating KSU Faculty by Their Perceptions about observability of Online Teaching

		Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	
Statement	***N***	***f***	***%***	***f***	***%***	***f***	***%***	***f***	***%***	***f***	***%***
I know of some faculty members who are using Web-based educational technologies.	20	0	0	2	10	0	0	7	35	11	55
I have observed some Web-based courses on my campus.	20	0	0	3	15	1	5	9	45	7	35
I am aware of the benefits of Web-based educational technologies for students	20	0	0	0	0	3	15	9	45	8	40
I am aware of the limitations of Web-based educational programs for students	20	0	0	0	0	6	30	9	45	5	25

4.3 Faculty's attitude toward online education

Faculty members' attitude toward online learning was measured by participants' responses to twelve statements; see Table 12. The overall mean for responses to these twelve statements was *M* = 3.68 with a standard deviation of *SD* = 1.10. This indicates a moderately favorable attitude toward online teaching.

Table 12: Distribution of Participating KSU Faculty by Their attitude of Online Teaching

		Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	
Statement	***N***	***f***	***%***	***f***	***%***	***f***	***%***	***f***	***%***	***f***	***%***
E-Learning can solve many of our educational problems	20	1	5	2	10	4	20	8	40	5	25
E-Learning will bring new opportunities for organizing teaching and learning.	20	2	10	3	15	1	5	10	50	4	20
E-Learning saves time and effort for both teachers and students	20	2	10	1	5	4	20	7	35	6	30
E-Learning increases access to education and training.	20	1	5	4	20	2	10	8	40	5	25
E-Learning will increase my efficiency in teaching	20	0	0	3	15	5	25	5	25	7	35
E-Learning enables collaborative learning	20	1	5	3	15	3	15	7	35	6	30
E-Learning can engage learners more than other forms of learning	20	1	5	3	15	3	15	6	30	7	35
E-Learning increases the quality of teaching and learning because it integrates all forms of media ; print, audio, video, and animation	20	2	10	3	15	3	15	4	20	8	40
E-Learning increases the flexibility of teaching and learning	20	2	10	2	10	3	15	6	30	7	35
E-Learning improves communication between students and teachers	20	1	5	3	15	2	10	9	45	5	25
E-Learning enhances the pedagogic value of a course	20	3	15	1	5	4	20	6	30	6	30
Open universities should adopt more and more e-learning for their students	20	0	0	2	12	5	25	7	35	6	30

4.4 Relationship between personal characteristics and perceptions regarding key attributes of online education

4.4.1 Age of respondent and perceived attributes of online teaching

Table 13 shows the distribution of participating KSU faculty members' perceptions about attributes of online learning, classified by the respondent's age. It would appear that faculty perceptions about each attribute of online teaching did not vary significantly with age. For example, the analysis suggests that the null hypothesis of no correlation between age and perception regarding the relative advantage of online education cannot be rejected at the 5%, or even the 10%, level of significance (indeed, it can only be rejected at the 70% level). Similarly, the null hypothesis that there is no correlation between age and perceptions regarding the trialability of online teaching cannot be rejected at the 10% level of significance, and so on.

Table 13: Distribution of Participating KSU Faculty Perception about Attributes of Online Learning by Age

Relative Advantage	***n***	***Mean***	***SD***	***Sig.***
Age				
20-25	1	5		.7
26-30	6	3.8333	.83166	
31-35	6	4.2083	.65986	
36-40	4	3.5625	1.73656	
41-45	2	4.5000	.35355	
46-50	1	4.7500		
Trialability	***N***	***Mean***	***SD***	***Sig.***
Age				
20-25	1	3		.127
26-30	6	3.4583	.73172	
31-35	6	4.0417	.79713	
36-40	4	2.8125	1.12500	
41-45	2	4.3750	.17678	
46-50	1	5		
Observability	***N***	***Mean***	***SD***	***Sig.***
Age				
20-25	1	3.7500		.308
26-30	6	3.9167	.37639	
31-35	6	4.3333	.76920	
36-40	4	3.8125	.55434	
41-45	2	4.6250	.53033	
46-50	1	5		
Compatibility	***n***	***Mean***	***SD***	***Sig.***
Age				
20-25	1	5		.304
26-30	6	3.1250	1.08109	
31-35	6	4.0417	1.04183	
36-40	4	3.0625	1.17925	
41-45	2	2.8750	1.59099	
46-50	1	5		
Complexity	***n***	***Mean***	***SD***	***Sig.***
Age				
20-25	1	4		.610
26-30	6	3.3333	.49160	
31-35	6	3.5833	1.03280	
36-40	4	3	1.25831	
41-45	2	4		
46-50	1	4.5		

4.4.2 Gender of respondent and perceived attributes of online teaching

Table 14 shows the distribution of perceptions about attributes of online learning, according to the respondent's gender. It would appear that male respondents tend to rate online education more favorably than do female respondents with respect to the "relative advantage" attribute (the difference is significant even at the 1% level) and to the "complexity" attribute (the difference is significant at the 10% level) [1]. There is no evidence of any correlation between gender and perceptions regarding the other attributes.

[1] The ratings for "complexity" are based on a reverse scale, so that a higher score indicates a more favourable rating, that is, a *lower* level of complexity.

Table 14: Distribution of Participating KSU Faculty Perception about Attributes of Online Learning by Gender

Relative Advantage	***n***	***Mean***	***SD***	***Sig.***
Gender				
Male	12	4.5417	.39648	.004
Female	8	3.3438	1.15679	
Trialability	***n***	***Mean***	***SD***	***Sig.***
Gender				
Male	12	3.7292	.83570	.658
Female	8	3.5312	1.3733	
Observability	***n***	***Mean***	***SD***	***Sig.***
Gender				
Male	12	4.2708	.58832	.245
Female	8	3.9375	.63738	
Compatibility	***n***	***Mean***	***SD***	***Sig.***
Gender				
Male	12	3.7292	1.04696	.421
Female	8	3.2812	1.39154	
Complexity	***n***	***Mean***	***SD***	***Sig.***
Gender				
Male	12	3.7708	.64366	.087
Female	8	3.0938	1.03456	

4.4.3 Respondent's education level and perceived attributes of online teaching

Table 15 shows the distribution of respondents' perceptions about attributes of online learning, by the respondent's level of education. Faculty perceptions about the "observability" attribute appear to correlate with the respondent's education level, in that respondents with higher education levels tend to rate online education more favorably with respect to this attribute (the difference being significant at the 10% level). There is no evidence of any correlation between education level and perceptions regarding the other attributes.

Table 15: Distribution of Participating KSU Faculty Perception about Attributes of Online Learning by level of education

Relative Advantage	***n***	***Mean***	***SD***	***Sig.***
Level education				
Bachelors	6	3.6667	1.44626	.373
Master's	12	4.1458	.71078	
Doctoral	2	4.7500		
Trialability	***n***	***Mean***	***SD***	***Sig.***
Level education				
Bachelors	6	3.5417	.82790	.322
Master's	12	3.5417	1.00472	
Doctoral	2	4.6250	.53033	
Observability	***n***	***Mean***	***SD***	***Sig.***
Level education				
Bachelors	6	4.2083	.62082	.073
Master's	12	3.9583	.55220	
Doctoral	2	5		
Compatibility	***n***	***Mean***	***SD***	***Sig.***
Level education				
Bachelors	6	3.6250	1.40312	.970
Master's	12	3.5417	1.01597	
Doctoral	2	3.3750	2.29810	
Complexity	***n***	***Mean***	***SD***	***Sig.***
Level education				
Bachelors	6	3.1250	.93207	.274
Master's	12	3.5625	.84022	
Doctoral	2	4.2500	.35355	

4.4.4 Respondent's professional area and perceived attributes of online teaching

Table 16 shows the distribution of respondents' perceptions about attributes of online learning, by the respondent's professional area. It is apparent that respondents from the computer science college tend to rate online education more favorably than do respondents from the education college. These differences (and other inter-faculty differences) were sufficient to allow us to reject the null hypothesis (of no relationship between a respondent's professional affiliation and his or her perceptions regarding attributes of online education) with respect to three attributes: trialability and complexity at the 5% significance level [1], and observability at the 10% level.

[1] Recall that complexity is measured by a reverse scale, so that a higher score indicates a more favorable rating, that is, one indicating *less* complexity.

Table 16: Distribution of Participating KSU Faculty Perception about Attributes of Online Learning by professional area

Relative Advantage	***n***	***Mean***	***SD***	***Sig.***
Professional area				
Computer science	2	4.5	.35355	.528
Education	8	3.6250	1.28174	
Business	4	4.0625	.94373	
Science	2	4.2500	.35355	
Engineering	4	4.6250	.32275	
Trialability	***n***	***Mean***	***SD***	***Sig.***
Professional area				
Computer science	2	4.8750	.17678	.036
Education	8	3.1250	.79057	
Business	4	3.2500	1.15470	
Science	2	3.8750	.53033	
Engineering	4	4.3750	.25000	
Observability	***n***	***Mean***	***SD***	***Sig.***
Professional area				
Computer science	2	4.6250	.53033	.091
Education	8	3.6875	.49552	
Business	4	4.4375	.65749	
Science	2	4.2500	.70711	
Engineering	4	4.4375	.42696	
Compatibility	***n***	***Mean***	***SD***	***Sig.***
Professional area				
Computer science	2	5		.131
Education	8	3.0313	1.20592	
Business	4	3	1.25831	
Science	2	4.1250	.17678	
Engineering	4	4.1250	.82916	
Complexity	***n***	***Mean***	***SD***	***Sig.***
Professional area				
Computer science	2	4.6250	.17678	.047
Education	8	2.8750	.69437	
Business	4	3.8125	.74652	
Science	2	3.8750	.17678	
Engineering	4	3.6875	.94373	

4.4.5 Respondent's general teaching experience and perceived attributes of online teaching

Table 17 shows the distribution of respondents' perceptions about attributes of online learning, by the respondent's years of general teaching experience. The latter variable appears to have no impact on faculty perceptions about the various attributes of online teaching: the null hypothesis cannot be rejected at the 10% significance level for any of the five attributes.

Table 17: Distribution of Participating KSU Faculty Perception about Attributes of Online learning by teaching experiences

Relative Advantage	***n***	***Mean***	***SD***	***Sig.***
Teaching experiences				
>2 years	6	4.0833	.98319	.330
3-6	7	4.3214	.78680	
7-9	2	2.6250	1.59099	
10-12	3	3.9167	.80364	
13-15	1	4.7500		
16-18	1	4.7500		
Trialability	***n***	***Mean***	***SD***	***Sig.***
Teaching experiences				
>2 years	6	3.7083	.91401	.550
3-6	7	3.5714	1.01770	
7-9	2	2.7500	.70711	
10-12	3	3.6667	1.04083	
13-15	1	4.2500		
16-18	1	5		
Observability	***n***	***Mean***	***SD***	***Sig.***
Teaching experiences				
>2 years	6	4.2083	.62082	.255
3-6	7	4.1429	.55635	
7-9	2	3.6250	.17678	
10-12	3	3.7500	.66144	
13-15	1	5		
16-18	1	5		
Compatibility	***n***	***Mean***	***SD***	***Sig.***
Teaching experiences				
>2 years	6	3.8750	1.32051	.174
3-6	7	3.8571	1.00889	
7-9	2	2.2500	.35355	
10-12	3	3.1667	.76376	
13-15	1	1.7500		
16-18	1	5		
Complexity	***n***	***Mean***	***SD***	***Sig.***
Teaching experiences				
>2 years	6	3.3750	.70267	.278
3-6	7	3.8214	.87457	
7-9	2	2.3750	.88388	
10-12	3	3.2500	.90139	
13-15	1	4		
16-18	1	4.5		

4.4.6 Respondent's online teaching experience and perceived attributes of online teaching

Table 18 shows the distribution of respondents' perceptions about attributes of online learning, by the respondent's experience (or lack of experience) with online teaching. Faculty respondents with prior experience with online teaching tend to rate this form of teaching more favorably than do respondents who do not have such experience. For example, the null hypothesis of no differences in faculty perceptions about the trialability of online teaching between faculty members with and without prior online teaching experience can be rejected at the 5% significance level. A similar conclusion applies with respect to both observability and compatibility, but at a higher (10%) significance level.

Table 18: Distribution of Participating KSU Faculty Perception about Attributes of Online Learning by online teaching experiences

Relative Advantage	***n***	***Mean***	***SD***	***Sig.***
Online teaching experiences				
Have online teaching experience	15	4.2167	1.01712	.229
Have no online teaching experience	5	3.600	.72024	
Trialability	***n***	***Mean***	***SD***	***Sig.***
Online teaching experiences				
Have online teaching experience	15	3.9167	.85912	.024
Have no online teaching experience	5	2.8500	.76240	
Observability	***n***	***Mean***	***SD***	***Sig.***
Online teaching experiences				
Have online teaching experience	15	4.2833	.61140	.064
Have no online teaching experience	5	3.7000	.41079	
Compatibility	***n***	***Mean***	***SD***	***Sig.***
Online teaching experiences				
Have online teaching experience	15	3.8333	1.24164	.061
Have no online teaching experience	5	2.7000	.20917	
Complexity	***n***	***Mean***	***SD***	***Sig.***
Online teaching experiences				
Have online teaching experience	15	3.6333	.90073	.243
Have no online teaching experience	5	3.1000	.67546	

4.5 Relationship between perceptions regarding key attributes of online education and attitude toward it

Table 19 shows the correlation coefficients that describe the degree to which variations in faculty attitude toward online teaching are associated with variations in faculty perceptions regarding the attributes of online teaching. As can be expected, faculty attitude toward online teaching is correlated with faculty ratings of all five attributes of online education. The strongest correlations exist between faculty attitude and faculty ratings of relative advantage and compatibility. This accords with intuitive expectations, in that the more a particular faculty member sees online teaching as possessing a competitive advantage over conventional forms of teaching and/or as being compatible with his or her own values and beliefs, the more he or she is inclined to accept this innovation in teaching. The internal consistency of these findings also serves to reinforce confidence in their validity, in the sense discussed above (see also Golafshani, (2003)

The correlation is slightly less strong between faculty attitude on one hand and, on the other, faculty ratings of the trialability and complexity of online teaching. And it is at its weakest between faculty attitude and faculty rating of the observability of online teaching's effects. Nevertheless, it is of interest to note that even in this weakest-correlation case, the positive association observed is still significant at the 10% level. As for the other four cases, the positive correlation is significant at a much more stringent (1%) level

Table 19: Correlation Matrix

		Attitude	Relative Advantage	Compatibility	Trialability	Complexity	Observability
Attitude	Correlation	1.000	.808	.768	.623	.611	.414
	Sig.		.000**	.000**	.003**	.004**	.070

**. Correlation is significant at the 0.01 level (2-tailed).

5 Summary and further discussion

5.1 Summary of main findings

The above results can be summarized in terms of the four research questions listed at the beginning of the paper.

Research Question 1: How do faculty members in King Saud University perceive key attributes of online teaching?

Based on an analysis of the data sample collected for this study, it would appear that in general, responding faculty members at King Saud University rate online education favorably, with respect to all five attributes considered critical for the successful diffusion of an innovation. Faculty ratings tend to be higher for the attributes of "relative advantage" and "observability": online teaching is rated, on average, above 4 out of 5 in terms of relative advantage (compared with conventional teaching) and the observability of its effects. Ratings of compatibility (with the respondent's prior beliefs and values), complexity, and trialability (being amenable to being implemented on a trial, small-scale basis) tend to be lower – around 3.5 out of 5.

Research Question 1: What is the attitude of faculty members toward online teaching?

On the whole, responding faculty members tend to hold moderately favorable attitude toward online teaching, with a mean score of around 3.7 out of 5.

Research Question 3: Is there a relationship between a faculty member's personal characteristics and his/her ratings of key online teaching attributes?

There is some evidence of relationships between a faculty member's characteristics and his or her ratings of the attributes of online teaching. In particular, respondents from the education college tend to give lower ratings, and respondents from the computer science college tend to give higher ratings, with respect to three out of the five attributes. Similarly, respondents with some prior online teaching experience give higher ratings than those given by respondents without such experience – this comment applies in the case of three (out of five) attributes. In addition, male respondents tend to rate online teaching more favorably than female respondents do. Finally, respondents with doctoral degrees tend to

give higher ratings than those given by respondents with master and bachelor degrees. All of these findings are consistent with intuitive expectations.

Research Question 4: Is there a relationship between faculty ratings of key online teaching attributes and faculty attitude toward online teaching?

There is a significant and positive correlation between faculty attitude toward online teaching and faculty rating of each of the five attributes. The strongest correlation exists between faculty attitude and faculty ratings of "relative advantage" and "compatibility. Less strong correlation exists between faculty attitude and faculty ratings of "trialability" and "complexity". The least strong correlation is between faculty attitude and faculty rating of "observability". These findings tend to support the importance of the five attributes identified by Rogers (2003) as critical factors in determining whether an innovation, such as online education, will gain acceptance among practitioners and become widely diffused and adopted.

5.2 Further discussion and directions for future research

The findings reported above are broadly consistent with those reported by previous studies in this area. With regard to some on-going questions, the present findings have added to the evidence being accumulated. For instance, while AL-Augab (2007) and Li (2004) found that prior online teaching experience does not influence a particular faculty member's perception of online teaching attributes, Tabata and Johnsrud (2007) found that faculty members with such experience tend to rate online teaching more favorably than those who do not have such experience. Our results lend support to the latter finding, in the context of a Saudi Arabian university.

What are the implications of these findings for King Saud University (KSU) in particular and, more generally, for other universities? The finding that professional area, previous online teaching experience, and gender all affect a faculty member's perceptions about the attributes of online learning is of particular relevance. If the KSU and similar institutions wish to succeed in diffusing the use of online education, they may find it useful to work with groups of faculty members who are more likely to hold unfavorable perceptions in order to resolve any legitimate concerns and correct any misperceptions. These groups include faculty members who have not had prior experience with online teaching, who are female, or who are in disciplines other than computer science. It is particularly noteworthy that faculty members in the education field, who might be expected to have the most experience and expertise in relation to teaching, tended to show the highest level of skepticism or resistance to online teaching. Their views need to be listened to carefully and any valid concerns arising from the process need to be fully addressed.

More generally, the findings imply the need for universities to raise awareness among faculty members about the relative advantages enjoyed by online education, and about how online teaching can be made more compatible with their own practices and less complex for them. This is because the present study has found very high levels of correlation between faculty perceptions of these attributes and their attitude toward online teaching.

Further research on the matters raised above is continuing. We recognize the need to enlarge the sample, both in simple numerical terms and in terms of the types of faculty members approached for participation in the survey. Moreover, qualitative information gained through one-on-one interviews of focus groups may well provide additional insights into the relationship between particular personal characteristics (such as gender or professional area) and faculty ratings of online teaching.

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