

Faculty Satisfaction with the Information Technology Infrastructure at Saudi Universities: A Study of Faculty Perceptions

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Abstract

This study examined the satisfaction with and use of technology infrastructure by faculty across a sample of five universities in the Kingdom of Saudi Arabia. Overall, the findings indicated that faculty were relatively satisfied with the information technology (IT) infrastructure at their respective campuses, although they tend to report satisfaction levels more than faculty or students in the United States. The analysis uncovered disparities in the overall experience of faculty with IT between universities located in the capital city and universities outside the capital city.

Keywords: Saudi Faculty; Information Technology; Technology Support Services; Technology-Enabled Learning; Classroom Technologies

As a developing nation, the Kingdom of Saudi Arabia aims to increase its global effectiveness by positioning itself through diversifying its economy well beyond the historical dependence on oil. As part of the Vision 2030 plan, through training and education, the Tatweer policy initiatives seek to create a society that is capable to manipulate and utilize technology at a higher level (Prensky, 2001). The main goals of the Vision 2030 plan for the ambitious transformation of the Saudi society will become a reality only by implementing technology that is carefully aligned with the overall objective of preparing highly qualified individuals, who are equipped with the new millennium educational and career skills (Partnership for 21st Century Skills, 2009).

Asharq Al-Awsat (2007) noted that for the Kingdom of Saudi Arabia to achieve the goals of Vision 2030, the country must be willing to participate in a transformational revolution by focusing on developing high tech solutions and by improving institutional effectiveness via technology. Educators should focus, therefore, on educating students to use technology effectively and improve their skills.

Ghasemi and Hashemi (2011) observed that many developing nations in the world lack an extensive background in the use of information technology in their higher education institutions. The Tatweer policy implications would provide the Kingdom of Saudi Arabia a greater opportunity to implement new technologies in all aspects of the society.

Since the new generation of college students come to campus well equipped with digital technology skills and expect to use technology in their studies, it is critical that the universities adapt quickly their IT infrastructure, provide students with access to the latest digital learning technologies, and offer training and support to faculty in learning these new technologies. The purpose of this quantitative research was to describe the extent to which faculty who teach at KSA universities use the new information technologies at their campuses and are satisfied with the current technology infrastructure. Specifically, the following research questions guided this study:

1. To what extent does the current IT infrastructure on campus meet the needs of the KSA faculty?
2. How do KSA faculty perceptions of the IT infrastructure vary based on gender, teaching discipline, and campus location?

Methodology

This research was an ex-post facto cross-sectional study, using a quantitative research methodology. A survey was administered through Survey Monkey to assess faculty opinions of the IT infrastructure and use of technology at five universities located in the Kingdom of Saudi Arabia. The study examined the two research questions by incorporating the following variables (see Table 1).

Table 1
Dependent and Independent Variables Examined

Research Question	Dependent Variable (DV)	Independent Variable (IV)
RQ1	Faculty Satisfaction with University IT Infrastructure	NA
RQ2	Faculty Satisfaction with University IT Infrastructure	Gender, geographic location, teaching discipline

Faculty Satisfaction with the University IT Infrastructure was defined as the extent to which faculty members are satisfied with the following components of the IT resources within their institutions:

1. Technology-enabled learning and working spaces provided;
2. Technology-enhanced connections and communication resources;
3. Technology support services available, and;
4. Classroom technologies.

Three independent variables were examined in relation to faculty opinions of the IT Infrastructure: gender, teaching discipline, and campus location. Gender was coded as dichotomous variable, taking the values 1 for Males and 2 for Females.

Teaching discipline was coded as 1 for science, technology, engineering, and mathematics (STEM) fields and 2 for non-STEM majors. STEM areas included the following fields: biological/life sciences; computer and information sciences; engineering and architecture; manufacturing, construction, repair, or transportation; and physical sciences, including mathematical sciences. Non-STEM areas included the following fields: agriculture and natural resources; business, management, marketing; communications/journalism; education, including physical education; fine and performing arts; health sciences, including professional programs; humanities; liberal arts/general studies; public administration, legal, social, and protective services; and social sciences and other disciplines.

At the outset of the study, Campus Location included the following values:

1. University 1 (Public) is located in the Northern borders of the Kingdom with an estimated of 17, 000 students and 600 faculty members. The university has separate sections for male and female students.
2. University 2 (Public) has separate sections for male and female students and is located in the Eastern part of the Kingdom. The total student body is estimated to be 6,040 with 1,062 faculty members.
3. University 3 (Private) is a co-ed institution located in the Western part of the Kingdom with an estimated of 901 students and 133 faculty members.

4. University 4 (Public) is located in capital city of Riyadh with an estimated student population of 31,630 and 4,970 faculty members. The university has separate sections for male and female students.
5. University 5 (Private) is located in the capital city of Riyadh. The university is particularly geared towards female students and has a population of 60,000 students and an estimated 5,000 faculty members.

Since the majority of the survey respondents were located in Riyadh, Campus Location was recoded into a dichotmous variable: 1- Riyadh, and 2 - Outside Riyadh.

Participants in the faculty survey included 129 faculty. Approximately half of the respondents did not disclose their place of employment. Of those who identified their employer, the majority were teaching in the capital city, at University 4 and University 5. Of the remaining respondents, the majority were employed at University 1. The faculty sample characteristics are provided in Table 2.

Table 2

Characteristics of the Faculty Sample (N=129)

Sample Characteristic	%	N
Age		
30 or younger	20.6%	22
31-40	30.8%	33
41-50	29.0%	31
51-60	11.2%	12
Over 60	8.4%	9
Gender		
Male	33.0%	35
Female	66.0%	70
Not Identified	0.9%	1
Teaching Discipline		
STEM	34.2%	38
Non-STEM	65.8%	73

Note: Not all 129 faculty respondents answered the demographic questions.

The survey instrument used in this study was adapted from the Faculty Technology Survey developed by the EDUCAUSE Center for Analysis and Research (ECAR) and translated into Arabic. In order to meet the instructional technology and research computing demands of faculty, it is essential to understand how faculty relate to and use educational technologies, and what they think about their IT services. The ECAR Faculty Technology Survey was conducted three times and in its third edition, 13,451 respondents from 157 institutions in 7 countries (including the United States) and 37 states in the United States participated in the research.

For the current study, the researchers included the following sections from the ECAR Faculty Technology Survey: technology- enabled learning/working spaces; technology- enhanced connection and communication resources; technology support services; classroom technologies, and; demographics.

Findings

The main goal of this study was to examine the extent to which faculty make use of and are satisfied with the technology in each of the four categories. Table 3 presents the results of faculty satisfaction with technology-enabled learning and working spaces. Overall, faculty were generally satisfied with the technology-enabled learning and work spaces offered by their universities. In most areas, more than half of the respondents chose ratings of good or excellent. However, respondents were least satisfied with access to institutional resources while traveling, as only 39% rated this item as good or excellent.

Table 3

Descriptive Statistics for Technology-Enabled Learning and Working Spaces

Faculty Satisfaction with:	Service not offered	Haven't used in the past year	% Ratings Good or Excellent among Users	N
Classroom-based technology resources (e.g., computers, projection systems, lecture-capture systems, SMART boards, etc.)	3.9%	0.0%	78.2%	129
Laboratory or research-based technology resources (e.g., computers, research equipment, etc.)	9.4%	9.4%	65.4%	128
Online collaborative spaces in which your students or colleagues can work synchronously or asynchronously on projects	10.1%	3.1%	75.0%	129
Physical collaborative spaces (e.g., computer labs, testing centers, research labs, active learning classrooms, etc.)	9.6%	12.0%	52.0%	125
Access to institutional resources while working from home	13.6%	4.8%	56.9%	125
Access to institutional resources while traveling and/or living in other states or countries	16.1%	9.7%	39.1%	124
Ability to get my work done while working from home	8.0%	6.4%	74.8%	125
Ability to get my work done while traveling and/or living in other states or countries	8.7%	11.0%	60.8%	127

When respondents were asked to indicate their satisfaction with the technology-enabled connections and communication resources at their universities, most were pleased with the services offered, particularly with the reliability of the Wi-Fi infrastructure (81%) and the communication technologies (88%) on campus. Yet, about 25% report that they have not used video conferencing technologies; of those who used such technologies, only 57% rated them as good or excellent. In addition, approximately 43% of the respondents have not accessed remotely software applications; of those who did have remote access to software, only half were satisfied with these resources. Lastly, only 63% of the respondents rated the online or virtual technologies at their university as good or excellent (see Table 4).

Table 4*Descriptive Statistics for Technology-Enabled Connections and Communication Resources*

Descriptive Statistics	Service not offered	Haven't used in the past year	% Good or Excellent	N
Reliable access to Wi-Fi networks throughout campus	7.4%	4.1%	81.5%	122
Communication technologies (e.g., e-mail, instant messaging, social media, etc.)	1.6%	0.8%	88.2%	122
Videoconferencing technologies (e.g., Skype, Google Hangouts, Adobe Connect, other web-based conference services)	9.8%	14.6%	57.0%	123
Online or virtual technologies (e.g., network or cloud-based file storage system, web portals, etc.)	7.3%	9.7%	63.1%	124
Remote access (as opposed to locally install) to commercial software applications (e.g., MATLAB, GIS applications, statistical software, graphics software, textual or image analysis programs, etc.)	20.5%	23.0%	49.3%	122

Faculty members were also generally satisfied with the technology support services offered at their campus (see Table 5). More than 60% rated technology support and professional development on use of technology in teaching as good or excellent. However, about a fourth of respondents have not received support for making courses accessible to students with disabilities; of those who did have such support, only half were satisfied. In addition, 25% did not use or did not have support for specialized teaching software. Of the users, only 44% were satisfied with the support received.

Table 5*Descriptive Statistics for Technology Support Services*

Descriptive Statistics	Service not offered	Haven't used in the past year	% Good or Excellent	N
Technology support (e.g., desktop support, classroom technology support, course media production support, etc.)	6.8%	6.0%	63.7%	117
Professional development around the integrated use of technology in your teaching, whether face-to-face or online (e.g., technology training opportunities, incentives, and professional advancement)	6.0%	8.6%	65.0%	117
Support for making courses accessible to students with disabilities	7.8%	15.5%	50.6%	116
Professional development and training opportunities around the integrated use of technology in your research	6.0%	6.0%	54.9%	116
Individualized consultations for using technology in teaching (e.g., course design)	6.9%	8.6%	58.2%	116
Specialized teaching software	10.6%	15.0%	44.0%	113

Approximately two-thirds of the faculty were satisfied with the availability of classrooms with multimedia equipment (see Table 6). More than half of the faculty were satisfied with the reliability of equipment, the general use of instructor stations in the classrooms, the software installed on the instructor-station computers, and the computer projectors. However, less than half of the faculty gave favorable ratings to wireless access in the classroom and audience response systems (clickers).

Table 6*Descriptive Statistics for Satisfaction with Classroom Technologies*

	Satisfied	N/A	N
Availability of classrooms with multimedia equipment	66.3%	7.1%	112
Reliability of equipment available	63.8%	6.3%	112
General ease of use of instructor stations	63.5%	7.1%	112
Computers in the instructor stations	59.8%	8.1%	111
Software on the instructor-station computers	59.6%	10.8%	111
Computer projection	53.6%	11.8%	110
Audience response systems (clickers)	46.9%	14.3%	112
Wireless access	45.8%	14.3%	112

Overall, about 68% of the faculty were satisfied with the technology at their campus, rating their experience as good or excellent and 28% rated their overall experience as fair or poor (see Table 7).

Table 7*Overall Experience with Technology at Current Institution*

	N	%
Poor	10.8%	12
Fair	17.1%	19
Neutral	4.5%	5
Good	48.7%	54
Excellent	18.9%	21

Differences by Gender. To compare satisfaction with the IT infrastructure between male and female faculty, the researchers examined mean satisfaction levels. Table 8 indicates that average satisfaction ratings are comparable between men ($M = 3.69$) and women ($M = 3.47$), showing a slightly more favorable rating for men.

Table 8*Overall Technology Experience by Gender*

Gender	N	Mean	SD
Male	35	3.69	1.25
Female	70	3.47	1.21

Note: Overall Technology Experience was measured on a 5-point Likert Scale with the following values:

1 = Poor, 2 = Fair, 3 = Neutral, 4 = Good, 5 = Excellent

To determine whether there was a significant difference between male and female faculty, the researchers conducted an independent samples *t* test. The results are summarized in Table 9 and indicate that satisfaction with the university technology infrastructure does not differ significantly between male and female faculty, $t(103) = .84, p = .40$.

Table 9

Results of Independent Samples T-test: Overall Technology Experience by Gender

	Levene's Test for				
	Equality of Variances		t-test for Equality of Means		
	F	p	t	df	p
Equal variances assumed	.005	.944	.844	103	.401
Equal variances not assumed			.834	66.058	.407

Differences by Campus Location. The majority of the faculty respondents (74%) in the sample were concentrated in universities located in the capital city of Riyadh (Universities 4 and 5). About 24% of the respondents came from universities located outside Riyadh. The descriptive statistics for satisfaction with the IT infrastructure show that faculty who teach at universities located in Riyadh were more satisfied with the technology infrastructure at their campus than faculty who teach outside Riyadh (see Table 10).

Table 10

Overall Technology Experience by University Location

Location	<i>N</i>	<i>Mean</i>	<i>SD</i>
Riyadh	72	3.75	1.06
Outside Riyadh	27	3.11	1.48

NOTE: Overall Technology Experience was measured on a 5-point Likert Scale with the following values: 1 = Poor, 2 = Fair, 3 = Neutral, 4 = Good, 5 = Excellent

To assess whether average satisfaction with the IT infrastructure differed significantly between the two groups, the researchers employed an independent samples *t* test. The results are summarized in Table 11 and show that there was a significant difference between the two groups, $t(36) = 2.06, p < .05$. Specifically, faculty who teach at universities in Riyadh are significantly more satisfied with the technology infrastructure at their campus than faculty who teach outside the capital.

Table 11

T-test Results for Differences in Overall Technology Experience by University Location

	Levene's test of					
	Equality of		t test of equality of means			
	F	Sig.	t	df	Sig. (2-tailed)	
q6	Equal variances assumed	14.978	.000	2.389	97	.019
	Equal variances not assumed			2.059	36.487	.047

Differences by Teaching Discipline. Teaching disciplines were grouped into two large categories: STEM and Non-STEM disciplines. Table 12 displays the average satisfaction ratings for the two groups of faculty, indicating that the two averages are comparable.

Table 12*Overall Technology Experience by University Location*

Location	<i>N</i>	<i>Mean</i>	<i>SD</i>
Riyadh	72	3.75	1.06
Outside Riyadh	27	3.11	1.48

NOTE: Overall Technology Experience was measured on a 5-point Likert Scale with the following values: 1 = Poor, 2 = Fair, 3 = Neutral, 4 = Good, 5 = Excellent

As with the other independent variables, an independent samples *t*-test was conducted to determine whether the two averages differ significantly. The results of the test indicate that there was no significant difference between STEM and Non-STEM faculty in terms of the overall experience with technology on campus, $t(109) = .60$, $p = .549$ (see Table 13).

Table 13*T-test Results for Differences in Overall Technology Experience by Teaching Discipline*

	Levene's test of Equality of Variances				
	F		t test of equality of means		
		Sig.	t	df	Sig. (2-tailed)
Equal variances assumed	1.683	.197	.602	109	.549
Equal variances not assumed			.631	85.678	.530

Discussion of the Findings

Faculty at Saudi universities are, by and large, relatively satisfied with the information technology infrastructure and support at their institution. In response to a question asking faculty to describe their overall technology experience at their institution, 68% of respondents rated their experience as good or excellent, and 28% rated poor or fair. However, this level of satisfaction is slightly lower when compared to faculty responses for universities in the United States where 71% rated their experience as good or excellent and only 18% rated it as poor or fair (Pomerantz & Brooks, 2017).

We found no significant difference between male and female faculty with regard to their overall IT experiences at their universities. This is an encouraging finding given the KSA government's recent efforts to close the gender gap in education and the labor market. Similarly, the overall experience with IT did not vary significantly with the faculty member's field of teaching (STEM vs. non-STEM). However, the results of the survey showed that faculty teaching at universities located outside the capital city (particularly in the northern part of the country) generally have a less positive experience with the IT infrastructure at their campus than faculty teaching in the capital city (Universities 4 and 5). This reveals that there are geographic differences in the level of investment in technology infrastructure across the nation.

Implications

It is evident from the faculty survey findings that universities in the northern part of the country do not have the same level of technology resources that universities in the capital city enjoy. Therefore, much attention should be paid to reducing geographic disparities in technological investments if the goals of Vision 2030 are to be materialized. The results also suggest that universities should aim to increase faculty use of video conferencing technologies and improve services related to online or virtual technologies and remote access from off-campus to software applications.

Limitations

The findings of this study were based on a relatively small convenience sample of faculty drawn from five universities. Therefore, the results cannot be generalized to the entire higher education sector in Saudi Arabia. Future research should employ random or stratified sampling techniques that ensure generalizability to the wider Saudi population of faculty.

Secondly, this research utilized only surveys as the main method of gathering opinions on the adequacy and use of information technology on campus. Future research studies should consider adopting a mixed methods approach where qualitative feedback about experiences with the technology is gathered via interviews or focus groups with students and faculty. A qualitative approach involving such methods could provide an insight into some of the low ratings given by faculty in the survey responses. In addition to gathering the opinions of faculty, future studies should also capture the perspective of IT leaders and staff. Obtaining feedback from these stakeholders would make possible the triangulation of the results generated from the faculty surveys.

Lastly, it important to study in more detail the gap in satisfaction that was found between universities in the capital and universities in the northern part of the country. A more realistic assessment of the disparities in the technology infrastructure could be examined through more objective measures, such as number of classrooms equipped with smartboards, percentage of instructors using learning management systems and availability of applications for mobile devices.

Conclusions

This study examined faculty satisfaction with and use of the in information technology infrastructure by faculty across a sample of five universities in the Kingdom of Saudi Arabia. Overall, the findings indicated that faculty were relatively satisfied with the IT infrastructure at their respective campuses, although they tend to report slightly lower satisfaction levels than faculty or students in the United States. In addition, the study uncovered disparities in the overall experience of faculty with IT between universities located in the capital city and universities outside the capital city. Additional studies are needed to further investigate such disparities by assessing resources available at various universities.

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