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Extent of mastering Twenty-First-Century E-Learning competencies among Prince Sattam Bin Abdulaziz University Staff

مدى تمكن أعضاء هيئة التدريس بجامعة الأمير سطام بن عبد العزيز من كفايات التعلم الإلكتروني للقرن الحادي والعشرين

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Abstract

This study aims to identify the extent of mastery of the lecture staff of Prince Sattam Bin Abdulaziz University over e-learning competencies in the twenty-first century. Hence, the study population comprised all Prince Sattam staff members (N=436); from this population, a random sample was selected (N=102). The study followed the descriptive research approach. The questionnaire results revealed that the staff members have high e-knowledge, with an average degree of 4.09, and master the competency of using technologies in the educational process to a high degree, average of 4.04. Furthermore, they master the competency to design and manage e-courses to a moderate degree (3.39). Notably, the study showed statistically significant differences (at a level of a=0.5) between male and female participants in the domains of e-knowledge, use of technologies in the educational, and design and management of e-courses and demonstrated better performance in these aspects by female participants. Moreover, the results showed that there were statistically significant differences at a=0.05 level according to the participants' academic degree (demonstrator and lecturer or assistant professor to professor) and that staff members such as demonstrators and lecturers master the domains of e-knowledge and technology use in the educational more easily than other staff members.

Keywords: descriptive research, educational process, e-knowledge, e-learning competency for the twenty-first century, staff member.

الملخص:

هدفت الدراسة الحالية إلى تحديد درجة تمكن أعضاء هيئة التدريس بجامعة الأمير سطام بن عبد العزيز لكفايات التعلم الإلكتروني للقرن الحادي والعشرين، وتكون مجتمع الدراسة من جميع أعضاء هيئة التدريس بكليات وادي الدواسر والسليل وكان عددهم (436)، تم اختيار عينة عشوائية منهم بلغ عددهم (102) عضو هيئة تدريس و اتبعت الدراسة منهج البحث الوصفي. وأشارت نتائج الدراسة إلى أن أعضاء هيئة التدريس لديهم معرفة إلكترونية بدرجة عالية بمتوسط حسابي (4.09)، ويتقنون كفاية استخدام التقنيات في العملية التعليمية بدرجة عالية بمتوسط حسابي (4.04)، أما بالنسبة لكفاية تصميم وإدارة المقرر الإلكتروني فجاءت بدرجة متوسطة حيث كان بمتوسط حسابي (3.39)، كما كشفت الدراسة وجود فروق ذات دلالة إحصائية عند مستوى (a =0,05) بين نوع الجنس(ذكر /أنثى) في محور المعرفة الإلكترونية و محور استخدام التقنيات في العملية التعليمية و محور تصميم وإدارة المقرر الإلكتروني وجميعها لصالح الإناث. كما أكدت الدراسة وجود فروق ذات دلالة إحصائية عند مستوى (a=0,05) بين الدرجة العلمية (معيد ومحاضر/أستاذ مساعد إلى أستاذ) في محور المعرفة الإلكترونية و محور استخدام التقنيات في العملية التعليمية وذلك لصالح (معيد ومحاضر).

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Introduction

In this modern era, there is growing concern among educators and educational stakeholders regarding recent technological changes and the means of transforming and exchanging knowledge. However, the efficacy of these technological changes has been ascertained. In this context, a clear understanding of the modern communication variables and techniques can contribute to the design and provision of appropriate environments that facilitate the educational process that employs modern communication techniques in a manner that befits the changing circumstances (Ilyashenko, Gladkova, Kutepov, Vaganova & Smirnova, 2019). Educational technologies play a significant role in individualizing the learning process and positively affect academic achievement and knowledge acquisition (Vaganova, Bogoslova, Nagovitsyn, Sundeeva & Morozova, 2020, Mahmoud, 2021).

Accordingly, Al-Mutairi (2017) explained how scientific and technological developments affect various domains, including education, which further specifies the necessity of adjusting to such changes. Hence, the introduction of modern technologies with all their innovations in terms of educational tools, materials, and devices in the field of education is necessary to improve the educational process, increase its efficiency and effectiveness, and create a qualitative shift in teaching and evaluation methods and means.

Accordingly, educational technology is one of the most important domains that many universities expect to benefit from, and its application is an important source of information. This significant capability of educational technology in various educational fields to transform learners' skills and experiences has received considerable attention from educational researchers. Further, compared to traditional methods of lecturing and information narration, the use of technology increases the ability of students by shifting their role from being information receivers to interacting with the educational environment through technology and taking advantage of all its valuable capabilities.

Al-Saedi and Na'im (2016) confirmed that technology enhances and expands learning opportunities, improves the results of the educational process, achieves equity in access to education, enables inclusiveness in the educational process, and helps students acquire valuable skills in using various devices and electronic programs.

Study problem

Saudi Arabia has consistently strived to advance educational performance and improve its different aspects, particularly in university-level educational institutions, to achieve the kingdom's vision for 2030 and the national transformational program of 2020 (Saudi vision 2030, 2019). Technology plays a significant role in increasing educational efficacy. Therefore, in recent years, the Prince Sattam bin Abdulaziz University (PSAU), Al-Kharj, Saudi Arabia, has been rapidly taking steps to join the list of global universities achieving digital transformation, as represented by the Deanship of Information Technology and Distance Education. The Deanship is responsible for promoting e-learning culture in the university through workshops and training courses, and encouragement of staff members to carry out their practices by utilizing the resources and online platforms provided by the university (Al-Sharidah, 2019).

According to Vaganova, Odarich, Rudakova, Volkova, and Bulaeva (2020, p. 44), educational technologies change the process of preparation of students, which enables them to practice their acquired knowledge in real-world professional conditions.

As it is necessary to ensure the technological competence of every individual in educational settings, particularly to evaluate individuals' skills, knowledge, and attitudes, as required, staff members must master learning according to predetermined outcomes. Some studies indicate that many individuals lack sufficient experience and training in the field of technological competency acquisition, for instance, the studies by Gulbahar and Guven (2008) Al-Maamari and Al-Masrouri (2013) Celik (2021). Hence, staff members should possess many of the electronic competencies required in the twenty-first century. Based on these considerations, the researcher conducted this study to identify the extent to which PSAU staff members master the e-learning competencies required in the twenty-first century. The current study for the Saudi Arabian society is an opportunity to improve the level of university education to cope with the Kingdom's 2030 vision and the National Transformation Program 2020 (2016-2020).

Study questions

The study addressed the following main question:

What is the extent to which PSAU staff members master the e-learning competencies required in the twenty-first century, and what is its relation to variables such as gender and academic degree?

This question raises the following sub-question with two parts:

Are there significant statistical differences between the means of the scores of staff members' mastery of twenty-first-century e-learning competencies in the axes of electronic knowledge, use of technological techniques in the teaching process, and design and management of electronic courses according to (i) gender and (ii) academic degree?

Literature review

e-Learning is a modern style of learning that has become popular during the twenty-first century. It is based on the idea of investing in technical capabilities and means of communication to communicate information to students anywhere and at any time. Further, it involves the application of educational technology between a teacher and student either synchronously or asynchronously, and employs advanced educational techniques, such as educational media, three-dimensional effects, and virtual reality techniques, that provide more opportunities for teacher–learner interactions (Faris, 2008).

Several studies and literature reviews have investigated the concept of e-learning, which is defined as follows: "Flexible learning method using technological innovations and information network equipment via the Internet, relying on multi-directional communication and providing educational material concerned with interactions between learners and the teaching staff, expertise and software Anytime, anywhere" (Ismail, 2009, pp. 54-55).

Further, Arinto (2013) offered a framework to develop open and distance learning using the technological capabilities that are emerging in the twenty-first century. The study results suggested that faculty training programs should ensure the development of faculty's technological competencies, in addition to covering the four areas of change in curriculum design identified by the study regarding the extent of knowledge complexity and competencies required for each area, at each level, in all the four areas shown in Figure 1 (Arinto, 2013, p. 174).

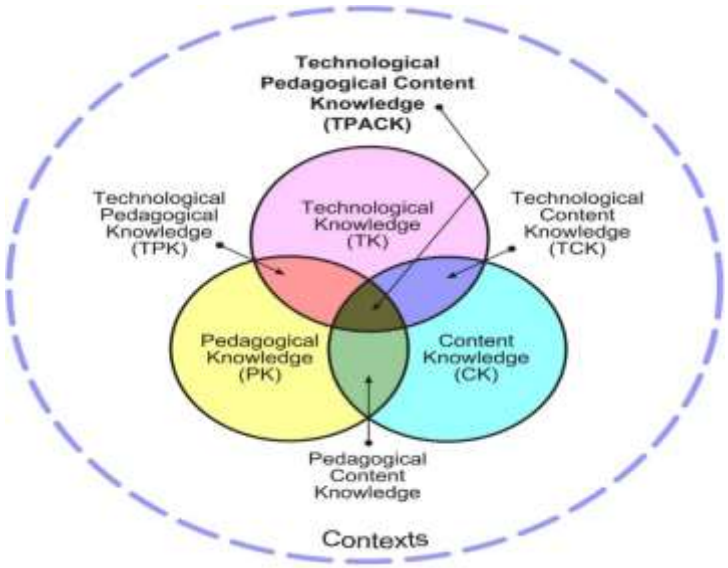

Fig. 1. Patterns of technological competencies; Technological Pedagogical Content Knowledge (TPACK), Pedagogical Content Knowledge (PCK), Technological Content Knowledge (TCK), Technological Pedagogical Knowledge (TPK), Technological Knowledge (TK), Pedagogical Knowledge (PK), and Content Knowledge (CK). Source: Arinto (2013).

In this study, a review of the studies that determine the extent to which staff members master electronic competencies revealed differences in the degree of mastery. The study by Al-Turki (2009) determined the degree and practice of e-learning competencies among King Saud University staff members; the results indicated that the faculty members had low

technological competencies in using network and Internet tools that require higher skills than the competencies associated with the theoretical aspects of e-learning.

The study by Al-Mutairi (2017) aimed to find the degrees to which staff members at the Faculty of Education, King Saud University, use the university-provided e-learning tools and identify the obstacles to using these tools. The study results demonstrated the usage degree of e-learning tools to be moderate. Further, there were statistically significant differences between the averages of the faculty members' use of e-learning tools for the variable academic degree (master of arts/doctor of philosophy) in favor of doctoral students.

Mohammed and Al-Sayyid (2014) investigated the e-learning competencies of 159 staff members of Um Al-Qura University. They concluded the presence of e-learning competencies (to an average degree) and specified the absence of any significant statistical differences in the existence of these competencies according to the gender variable (men/women). However, they found significant statistical differences for the field of specialization and experience in using the Internet.

Moreover, the study by Younis (2015) clarified the presence of e-learning competencies and the faculty's attitude toward e-learning competencies. The study examined 60 staff members of the faculties of science and human studies in Hawtah Sudayr and revealed that the staff's competencies of using the computer and the Internet were high, whereas those of designing and preparing electronic courses and managing and evaluating these courses were moderate.

The study conducted by Al-Sharidah (2019) identified the extent of applying the Blackboard system in the educational process for staff members at the Faculty of Education in PSAU from the perspective of students (men and women). Further, the study examined the availability of equipment that supports the implementation of the Blackboard system in classrooms. The results indicated that the usage level ranged from moderate to low degrees.

One of the most important results of the study by Wahsha (2017) was that the use of e-learning in Arabic language teaching was moderate (3.47) and that of e-learning had an average value of 3.58. Further, the study indicated the absence of statistically significant differences between the degree of using e-learning in the teaching of Arabic language materials at Najran University according to gender, school year, and accrual rate.

Finally, a study by Ibrahim and Al-Filkawi (2018) examined the e-learning competencies of staff members of the Faculty of Education at Kuwait University. The results revealed high efficiency in the use of computers and the Internet, but only moderate efficiency in classroom management.

Methodology

This study adopted the descriptive research approach, which relies on the study of the phenomenon as it exists, described the phenomenon accurately, and expressed it in quantitative terms. The study population consisted of the staff members of Wadi Al-Dawasir and Al-Sulayil colleges (the faculty of education, engineering, applied medical sciences; the faculty of arts; and the faculty of sciences and human studies in Al-Sulayil, PSAU) who were working during the academic year 2018–2019 (N=436 members). Further, a random sample was selected, which represented 25% (109) of the staff from different faculties. The e-questionnaire was answered by 105 respondents. After the questionnaire survey, three questionnaires were found incomplete, and hence, excluded from the study. Accordingly, 102 questionnaires were finally accepted.

Study instrument

e-Learning Competencies Questionnaire for the 21st Century

The e-Learning Competencies Survey for the 21st Century was designed based on some earlier studies, such as those by Al-Turki (2009), Mohammed and Al-Sayyid (2014), and Ibrahim and Al-Filkawi (2018). Further, to answer the research questions within the framework of this research, the researcher prepared a survey whose primary form was comprised of two main parts:

- Part one: inclusion of basic data (research variables: gender and academic degree)
- Part two: representation of questionnaire questions related to e-learning competencies for the twenty-first century, and inclusion of the three axes.

The psychometric characteristics of the questionnaire are as follows:

Questionnaire validity. The questionnaire was presented in its preliminary form by three Professors who are experts in the field of ICT to ensure the conformance of each questionnaire item to the axis it belongs to and the clarity of each item. Necessary adjustments were made based on the arbitrators' suggestions through addition or deletion of content. Finally, the questionnaire comprised of 42 items, which were classified as follows: first axis: electronic knowledge (8 items); second axis: the use of technologies in the educational process (15 items); and third axis: design and management of electronic courses (19 items). These items were placed in a five-point Likert scale as follows: master in a very high degree (5), master in a high degree (4), master in a medium degree (3), master in a weak degree (2), and master in a very weak degree (1).

Questionnaire reliability. The reliability of the questionnaire was confirmed by calculating the Cronbach's alpha coefficients for the three axes, as depicted in Table 1.

Results

Table 1.
Cronbach's Alpha Coefficients for the Axes of the Technological Competencies Questionnaire.

Axis of the questionnaire	Alpha coefficient (α)
e-Knowledge	.738
Use of technologies in the educational process	.920
Design and management of e-courses	.716
Reliability coefficient for the entire questionnaire	.882

Table 1 reveals that the reliability coefficient of the overall questionnaire was 0.88, which is a statistically acceptable value.

Table 2 depicts the study population's main data.

Table 2.
Analysis of the Research Sample according to Gender and Academic Degree.

	Gender	Frequency	Percentage
Gender	Male	36	35
	Female	66	65
	Total	**102**	**100**
Academic degree	Demonstrator and lecturer	25	24.5
	From assistant professor to professor	77	75.5
	Total	**102**	**100**

Table 2 reveals that 35% of the sample was male and 65% female respondents. Further, it reveals that 24.5% of the sample was comprised of demonstrators and lecturers, whereas 75.5% assistant professors, associate professors, and professors.

To answer the first research question, this study calculated the following: frequencies, percentages, averages, and standard deviations.

Frequencies, percentages, averages, and standard deviations (SDs) were calculated to determine the degree to which the study subjects estimated the questionnaire items. Tables 3, 4, and 5 depict the results.

Table 3.
Means and Standard Deviations of Staff Members' Mastery of Electronic Knowledge Competency.

No.	e-Competency	Means	SD	Rank
1	I know the PC's hardware and software	4.16	.793	4
2	I run the computer correctly	4.65	.574	1
3	I know the features of various operating systems (Windows, Unix, Linux, etc.)	3.68	.997	7
4	I can protect my PC from viruses and other spying programs	3.82	.959	6
5	I know the features of all PC types (iPad, laptop, etc.)	3.97	.959	5
6	I know how to divide the hard disk drive into partitions	3,55	1.174	8
7	I know how to download/delete the applications' programs according to my needs	4.32	.846	3
8	I know the different PC accessories (printer, scanner, etc.)	4.50	.805	2
General average for e-knowledge competency		4.09	.697	

PC: personal computer; SD: standard deviation.

According to Table 3, the competencies that were most commonly mastered by the faculty members to a very high degree were as follows: "I run the computer correctly," with a mean of 4.65 and SD of 0.574, and "I know how to divide the hard disk drive into partitions," with a mean of 3.55 and an SD of 1.174. In general, the faculty members had a high degree of electronic knowledge (mean of 4.095 and SD of 0.697).

Table 4.
Means and Standard Deviations for the Axis of Staff Members' Mastery over the Competency of Using Technologies in the Educational Process.

No.	e-Competency	Means	SD	Rank
1	I used MS Word in the educational process	4.68	.733	2
2	I design presentations using a program (e.g., Microsoft PowerPoint, Flash, or Swish)	4.40	.882	5
3	I process data using MS Excel spreadsheets	3.80	1.09	10
4	I establish databases for educational purposes using MS Access	3.39	1.23	14
5	I employ an infographic program that promotes the educational process (pictures and educational movie programs)	3.05	1.16	15
6	I use Data Show	4.31	.933	6
7	I use SMART Board in the educational process	3.89	.943	9
8	I use e-mail correctly (composing an e-mail, sending e-mails with attachments, receiving e-mails, and deleting unimportant messages)	4.73	.529	1
9	I use search engines to obtain useful information in the educational process	4.65	.539	3

10	I employ e-educational resources, such as the Sun platform and Saudi Digital Library, as learning resources	3.99	.873	8
11	I use the Internet to support scientific research (to facilitate access to the literature of earlier research studies—document quotations in the references appropriately)	4.60	.693	4
12	I employ e-Cloud (e.g., Google Drive) in the educational process for purposes such as designing questionnaires and tests and ensuring the safety and protection of important files on the Cloud	3.73	1.100	12
13	I employ YouTube in the educational process (establish an educational channel on YouTube and upload important video clips that serve the course)	3.51	1.217	13
14	I follow the rules for using the World Wide Web as per royalty protection	3.75	1.059	11
15	I use social media programs (WhatsApp, Twitter, Facebook, Telegram, Snap chat, etc.) for e-communication with the parties who are stakeholders in the educational process (students, teachers, parents, etc.)	4.12	1.146	7
General average for the use of technologies in the educational process		4.039	.618	

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Table 4 reveals that the competency that was most commonly mastered by faculty members in the use of technologies in the educational process axis is as follows: "I use e-mail correctly" (composing an e-mail, sending e-mails with attachments, receiving e-mails, and deleting unimportant messages…), with a mean of 4.73 and SD of 0.529. Further, the least proficient competency of the faculty members was "I employ an infographic program in the educational process" (pictures and educational movie programs), which had a mean of 3.05 and an SD of 0.618. In general, the staff members were competent in using technologies in the educational process, with a high mean of 4.039 and an SD of 0.618.

Table 5.

Means and Standard Deviations of Staff Members' Mastery of the Competency of Designing and Managing Electronic Courses.

No.	e-Competency	Mean	SD	Rank
1	Set the general objectives of the course to be prepared in an e-form	3.98	1.015	2
2	I decide on the e-content that supports the course's topics	4.18	.916	1
3	I use some e-evaluation tools to electronically decide on the students' abilities	3.41	1.084	9
4	I decide on the physical and human requirements to electronically prepare the course	3.72	.989	3
5	I design all my courses electronically	3.70	.952	4
6	I regularly develop e-courses	3.63	.964	5
7	I evaluate students through assignments and e-tests	3.04	1.202	16
8	I make e-stores for the questions	3.10	1.182	14
9	I apply various e-feedback methods	*3.20*	*1.135*	12
10	I consider international standards in designing e-courses, such as Quality Matters	*3.07*	*1.163*	15
11	I establish e-portfolios for the students	2.99	1.067	18

12	I apply various systems of e-course management, such as the Blackboard or MOODLE	3.57	1.156	7
13	I employ e-learning tools to inform students about managing the school curriculum (conduction of tests, an apology for not attending a lecture, some instructions, etc.)	3.60	1.119	6
14	I activate e-cooperation and group projects for the students through course activities	3.53	1.069	8
15	I activate virtual classes through Blackboard Collaborate Ultra	2.96	1.043	19
16	I activate the features of Blackboard in evaluating students' work	3.15	1.189	13
17	I train the students to complete the e-tests that are available in the Blackboard program.	3.02	1.219	17
18	I perform follow-ups of the students' learning and answer their questions through e-messages	3.35	1.256	10
19	I activate included learning strategies that suit the academic curriculum	3.25	1.123	11
General average of the competency to design and manage e-courses		3.39	.852	

Table 5 clarified that the most proficient competency mastered by the staff members regarding electronic course design and management was "I decide on the e-content that supports the course's topics," with a mean of 4.18 and an SD of 0.916, and the least proficient competency was "I activate virtual classes through Blackboard Collaborate Ultra," with a mean of 2.96 and an SD of 1.043. In general, the PSAU faculty members were moderately proficient in electronic course design and management, with a mean of 3.39 and an SD of 0.852. In summary, a comparison of the results depicted in Tables 3 to 5 revealed that the highest competency possessed by the PSAU faculty was the competence of electronic knowledge (high degree) and the least competency was that of designing and managing electronic courses (moderate degree).

Are there significant statistical differences between the means of the scores of staff members' mastery of twenty-first-century e-learning competencies in the axes of electronic knowledge, use of technological techniques in the teaching process, and design and management of electronic courses according to gender?

To determine the effect of gender on the degree of mastery of faculty members of e-learning competencies in the axes of e-knowledge area, use of technology in education, and design and management of e-courses, multiple analysis of variance (MANOVA) was performed on multiple dependent variables.

Table 6 reveals a statistically significant difference at a<0.05 in the electronic knowledge, use of technology in education, and design and management of electronic courses axes according to gender. Further, the variable's statistical significance was expressed as follows: F=7.965 was statistically significant at P=0.000, Wilks' Lambda=0.804, and eta squared=0.196.

Table 6.
Multivariate Test for the Gender Variable.

Independent variable		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Gender	Wilks' Lambda	0.804	7.965	3.000	98.000	0.00	0.196

To identify the effect of gender on each e-competency axis, variance analysis was performed. Table 7 reveals significant statistical differences at a<0.017 between male and female respondents for the three competency axes. The F=10.047 value was statistically significant at P=0.002 for e-knowledge competency, whereas the F=20.187 value was statistically significant at

P=0.000 for the use of technology in education. However, the F=21.92 value was statistically significant at P=0.000 for the design and management of e-courses. Hence, gender influenced all the e-competencies of the faculty.

Table 7.
Tests of Between-Subjects Effects.

Independent variable	Dependent variable	Type III sum of squares	df	Mean square	F	Sig.	Partial eta squared
Gender	Electronic knowledge	4.487	1	4.487	10.047	.002	.091
	Use of technology in education	6.489	1	6.489	20.187	.000	.168
	Electronic course design	13.206	1	13.206	21.920	.000	.180

To identify the gender category with significant influence on the three competency variables, the means and SDs of the corresponding data were calculated (Table 8), which clarifies that the mean of female staff's e-knowledge was 4.25, which is higher than the mean for male staff (3.81). Regarding axis (use of technology in the educational process) competency, the mean for female staff members on the use of technology in education was 4.22, which is higher than the corresponding value for male staff members (3.70). For the axis of design and management of e-courses, the mean for female staff members was 3.66, which was higher than the corresponding value for male staff members (2.90).

Table 8.
Descriptive Statistics.

	Gender	Mean	SD	N
Electronic knowledge	Male	3.81	.74288	36
	Female	4.25	.62444	66
	Total	4.09	.69757	102
Use of technology in education	Male	3.70	.68086	36
	Female	4.22	.49490	66
	Total	4.039	.61848	102
Electronic course design	Male	2.90	.89771	36
	Female	3.66	.70211	66
	Total	3.391	.85280	102

Are there significant statistical differences between the means of the scores of staff members' mastery of twenty-first-century e-learning competencies in the axes of electronic knowledge, use of technological techniques in the teaching process, and design and management of electronic courses according to academic degree?

To determine how academic degree influences the mastery of twenty-first-century e-learning competencies by PSAU staff members in the axes of electronic knowledge, use of technologies in the teaching process, and design and management of electronic courses, MANOVA was performed.

Table 9 depicted a statistically significant difference at a<0.05 in the degree of mastering e-learning competencies on the axes of e-knowledge, use of technology in education, and design and management of e-courses attributed to the academic degree. Further, the following values were observed: F=5.755; statistical significance level, P=0.001; Wilks' lambda=0.850; and partial eta squared=0.150.

Table 9.
Multivariate Test for Scientific Degree Variable.

Independent variable		Value	F	Hypothesis df	Error df	Sig.	Partial eta squared
Academic degree	Wilks' lambda	0.850	5.755	3.000	98.000	0.001	0.150

To identify how academic degree influences each e-competency axis, variation analysis was conducted. Table 10 clarified a significant statistical difference at a<0.017 on the axis of e-knowledge, with an F value of 17.046 and a statistical significance level of P=0.000. In addition, the results showed a significant statistical difference at a<0.017 on the axis of use of technology in education, since the F value was 9.55 and significance level was P=0.003. However, the results did not show significant statistical differences at a<0.017 on the axis of designing and managing e-courses; the value of F was 4.721 and the significance level was P=0.032, which imply that academic degree influenced the faculty's e-competencies in the axes of e-knowledge and use of technology in education, but had no impact on the design and management of e-courses.

Table 10.
Tests of Between-Subjects Effects.

Independent variable	Dependent variable	Type III sum of squares	df	Mean square	F	Sig.	Partial eta squared
Scientific degree	Electronic knowledge	7.158	1	7.158	17.046	.000	0.146
	Use of technology in education	3.370	1	3.370	9.555	.003	0.087
	e-Course design	3.312	1	3.312	4.721	.032	0.045

To determine the academic degree with the most influence on the axes of e-knowledge and use of technology in education, the means and SDs of different degrees were calculated, as shown in Table 11. The level of mastery of e-knowledge by a demonstrator and a lecturer was 4.56, which is higher than the level of the faculty members who were assistant professors or higher (3.94). On the axis of using technology in the educational process, the mastery level of staff members (a demonstrator and a lecturer) was (4.35), which is higher than that of staff members with designations of assistant professor and higher (3.93).

Table 11.
Descriptive Statistics for Scientific Degree.

Independent variable	Dependent variable academic degree	Mean	SD	N
Electronic knowledge	Below an assistant professor	4.56	.52678	25
	Assistant professor and higher	3.94	.68181	77
	Total	4.09	.69757	102
Use of technology in education	Below an assistant professor	4.35	.53422	25
	Assistant professor and higher	3.93	.61147	77
	Total	4.03	.61848	102

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Discussion

The study revealed that PSAU staff members master high e-competencies in the axes of electronic knowledge and use of technologies in the educational process. This result may be attributed to the significant interest that has been paid to e-learning by the university in recent years, which requires the university to continue motivating and encouraging e-knowledge acquisition or results from the society's

awareness of electronic measures and interest in an electronic culture.

Regarding the axis of use of technologies in the educational process, the results of this study are consistent with those of the study by Younis (2015), which indicated the existence of a high degree of competencies in using computers and the Internet among faculty members. This study's results were in agreement with the results of Ibrahim and Al-Filkawi (2018) as well, which confirmed that the staff members of the Faculty of Education in Kuwait University mastered the competencies of using the personal computer and the Internet to a high degree. However, this contrasts with the study by Al-Turki (2009), which indicated the low e-competencies pertaining to the Internet application, as well as the study by Al-Mutairi (2017), which stated that the degree of use of e-learning tools by faculty staff members was moderate. This result reveals faculty members' awareness of the importance of using modern educational technologies in the educational process.

Regarding the axis of e-course design, this study revealed that faculty staff members had moderate e-competencies. This is consistent with the studies by Younis (2015), Ibrahim and Al-Filkawi (2018), Mohammed and Al-Sayyid (2014), and Al-Sharidah (2019), which confirmed the presence of competencies for designing and preparing e-courses to a moderate degree among staff members.

Further, the studies by Gulbahar and Guven (2008), Al-Maamari and Al-Masrouri (2013), revealed that a portion of the faculty lacks e-learning experience and training. Although PSAU efficiently promotes the e-learning culture (Al-Sharidah, 2019), it is necessary to make utmost use of the potential of such technologies in the field of education, which is widely considered a measure of a country's development (Kozma, 2008).

Furthermore, this study proved that respondents' gender affected their mastery over e-learning competencies and that female respondents found it easier than male respondents to accept and master the e-learning competencies required in the twenty-first-century. The study by Wahsha (2017) revealed no significant statistical differences by gender in the degree of use of e-learning in Arabic subjects teaching in Najran University, and the same result was confirmed by the study conducted by Mohammed and Al-Sayyid (2014), which showed no significant statistical difference in the e-learning competencies of male and female participants.

This study revealed gender differences in the use of technology in education, such that female faculty members are more committed to following regulations and instructions, adjusting themselves to the latest developments in their fields of specialization, using e-knowledge and various technologies in the learning process, and designing e-courses.

Moreover, this study revealed that academic degrees from demonstrator and lecturer/assistant professor to professor affected the faculty members' e-learning competencies for the axes electronic knowledge and use of technologies in the educational process and that demonstrators and lecturers are more committed to mastering these competencies. This finding is consistent with the study by Al-Shehri and Hamdi (2011), which revealed statistically significant differences between the mean degrees of awareness of the virtual classes of faculty members according to the scientific degree variable (master's/PhD) in favor of master's degree; and the study by Al-Mutairi (2017), which revealed statistically significant differences between the means of educational e-tool use by faculty members by academic degree (master's/PhD) in favor of PhD students.

There may be differences attributed to academic degree within the study sample that show demonstrators and lecturers to have found it easier than all other designations to accept and master e-learning competencies. This might have been caused by the higher technical skills possessed by lecturers than professors, particularly in the degree of awareness of virtual classes. The lecturers were, in general, more aware of recent developments, as they were new bachelor or masters' degree graduates; and some of them used this awareness to complete their master's or PhD theses with their supervisors. In addition, the university is keen in enabling the qualification of new cadres of teaching assistants and lecturers in the field of e-learning.

Conclusions

This study clarified the extent of mastery of PSAU faculty members over the e-competencies in three axes, namely, e-knowledge, the use of technology in the learning process, and the design and management of e-courses. Besides, this study contributes to the determination of the degree of faculty members' readiness to adapt themselves to virtual education environments

(Arinto, 2013), which in turn contributes to the fulfillment of the kingdom's vision for 2030. Therefore, Saudi universities in general and PSAU faculty members; conduct training and applied programs for the faculty staff on the design and management of the E-courses. Provide the necessary support for the faculty staff to enable them use the E-learning competencies for the 21st century and follow up their teaching practices and enhance and encourage the faculty staff that uses the E-learning system.

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