Moderating Effect of Educational Technology on Academic Learning Environment in Higher Education in KSA

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The emergence of educational technology has created an impact on the academic environment in KSA. This paper identifies the awareness of female faculty members of higher education in KSA towards current educational technology, and analyses the association between the educational technology implemented by faculty members and the academic learning environment. The study was conducted in selected women's colleges of KSA. A survey was carried out among 300 female faculty members selected randomly from different colleges in KSA. The data received from the respondents was analysed with the help of the statistical software program SPSS. Descriptive statistics like mean and standard deviation were used in the study. A Pearson Correlation analysis was conducted to examine whether the hypothesis was accepted or rejected. It was found that there exists a significant positive correlation between the educational technology implemented by faculty members in class room and the overall academic learning environment. Recommendations for creating better learning environment in universities are included at the end of the research.

Key words: *Educational technology, Information communication technology, Technological tools, Academic learning environment, Learning outcomes.*

INTRODUCTION:

Educational technology refers to the use of electronic devices and applications to support learning. It includes computer mediated learning, LMS Blackboard, online learning, blended learning, e-learning, web-based learning, mobile learning, smart devices, Learning Management Systems (LMS), Course Management Systems (CMS), virtual classrooms, Virtual Learning Environments (VLE), collaborative learning environments, web-based learning, web-based instruction and a mix of educational technologies. The term 'academic learning environment' refers to the geographical location where the actual learning takes place, such as in conventional traditional classrooms, off campus or online. It can also refer to collaborative, virtual, course, program and learning management. Educational technology came into existence in 1959 within the Ministry of Education when a small audio-visual unit was established. In 1985, a general administration was established to promote educational technology in the Saudi education system. It providing training in educational technology and instructional material for many educational courses, supplying personal computers and computer hardware and software to various educational institutes. The Ministry of Education spent 281,658,489 SR from 1976 to 1982, on instructional media, materials and equipment to implement educational technology in higher education. The government spent over £2 billion in 2007, with the aim of reforming and enhancing education through the use of contemporary technologies. Thus, educational technology in KSA has been given sufficient importance in the Second (1975–1980) and Third (1980–1985) national plans. The fourth national plan (1985–1990) emphasised the outcome of quality education. Thus, the Saudi government invested a huge amount of the annual budget with the aim of advancing public education. The Saudi educational curriculum was revised to include technological devices. However, despite massive investment and governmental support, Saudi Arabia still lags behind when compared with other developed nations in effective utilisation of educational technology. The purpose of this study is to investigate whether the application of technology tools by faculty in class rooms can create a positive impact on the academic learning environment, or not. A survey was conducted in selected institutes of higher education in KSA to analyse the association between technology tools and the academic learning environment. Hence, the importance of this research is to suggest some effective solutions, which may help to make the implementation of educational technology in higher education in KSA more successful. The results of the study can ensure more efficient application of technology tools, to create a better academic learning environment and achieve the goal of quality education.

LITERATURE REVIEW

Studies addressing the impact of educational technology on various aspects of learning have been on the increase since the 1980s. The review included the study of critical factors affecting the application of educational technology in higher education in KSA, the barriers to the effective utilisation of technology tools in KSA, and the benefits of the proper application of technology tools to individuals and the organisation.

Critical factors affecting the application of educational technology in higher education in KSA

The effective implementation of technology in teaching and learning is affected by several factors, such as the beliefs and attitudes of educators towards educational technology, a lack of adequate organisational support, inadequate supportive resources, training, infrastructure, planning and resources, and an inability to access resources. Kelly and Maushak (2004) and Pleuchette and Rust (2005) explain the relationship of class size on effective use of technology in teaching and learning. Koehler and Mishra (2008) conclude that pedagogical training enables teachers to improve the learning of students using specific activities tailored to various subjects. Alshumaimeri (2008) investigated the link between ICT training and attitudes towards technological tools in language teaching, finding that ICT training increases teacher confidence and the probability of them using technological resources in instructional practices. Alharbi, 2014 concludes that professional development programs for teachers reduces their negative attitudes towards educational technology and resistance to change. Mofareh Alkrdem in 2014 examined the technological leadership behaviours among Saudi Arabian high school teachers. The results indicate that the head teachers generally demonstrated a high level of technological leadership behaviour. Albugami and Ahmed (2015) identify the critical factors affecting the implementation of technology in educational institutes in KSA. These comprised of adequate infrastructure, adequate management support, adequate teacher training on ICT and pedagogy, and a clear educational policy. Abdullah Alkraiji and Abdulhadi Eidaroos' (2016) research 'Trends and Issues in Educational Technology Research in Saudi Higher Education: A Meta-Analysis Review' reviews the trends concerning educational technology within Saudi universities and presents various issues upon which studies of educational technology have concentrated. They found types of technology and target groups as the critical factors affecting the application of technology tools in classrooms. Majed Gharmallah Alzahrani (2017) focused on the pertinent literature that intends to present the developments of technology in the Saudi higher education context. The findings indicate that training in using ICT is required for some academic staff and students. Anis Khayati and Mohammad Selim (2019) conducted a study on innovation in Saudi universities, and analysed its main features based on a number of pillars, such as the quality of education, innovation in educational programs and teaching methods, innovation in applied research related to the industry, innovation in developing partnerships and networks, social innovation, and innovation in achieving the university's financial sustainability. Results show that despite the increasing development of higher education, the reality of innovation in Saudi universities does not match the potential of the country. In general, the pace is slow and some constraints persist. It appears the huge amount of financial resources allocated to the higher education sector was not sufficient to improve innovation, and the qualitative aspects remained influential. Abdullah Alenezi (2019) evaluated the factors affecting the effective implementation of educational technology in academic institutes in KSA, identifying the following factors affecting usage of technology in

educational institutes: lack of management and technical support, time limitations, lack of ICT and pedagogical training, negative attitudes and beliefs towards educational technology, lack of clear policies and strategies on ICT adoption in learning institutions, resistance to change, and inadequate technological resources.

Barriers to effective utilisation of technology tools in KSA:

Christensen (2002) explains the need for faculty training in technology tools to increase confidence and competency levels. Brill and Galloway (2007) emphasise an inadequate availability of technology, and classrooms that do not adequately support technology, as major obstacles in the use of educational technology. Almaghlouth (2008) investigated the perceptions of Saudi science teachers towards the use of ICTs in instructional practices and found that even though some respondents perceived educational technology to be of immense value, they were reluctant to use the resources if there was no adequate support. Bingimlas (2009) states that resistance to change by faculty significantly hampers the successful implementation of ICT in classrooms. Almalki and Williams (2012) identify difference in culture as another factor that hinders the integration of educational technology into Saudi Arabian classrooms. They found that educators in Arab countries express some reservations about the constructivist learning advocated by western discourse. Fahad N.Alfahad (2012) conducted a study in the College of Education, King Saud University among female students of various courses to investigate the usefulness, efficiency and efficacy of information technology in higher education in the Kingdom of Saudi Arabia. They found that only 61.5 percent of the participants used an electronic device in their course activities.

Benefit of proper application of technology tools to individuals and the organisation:

Most studies have concluded that the adoption of educational technology has small to moderate effects on learning outcomes. Wael Sh.Basri, Jehan A.Alandejani and Feras M. Almadani (2018), investigated and explored the adoption of technology by universities and the impact it makes on university students' academic performance. The study also examined the moderating effects of gender, GPA and student majors on the relationship between technology and academic achievement. The findings reveal that there exists a relationship between ICT adoption and academic performance in a conservative environment. An additional finding also states that ICT adoption resulted in the improvement of the performance of female students more than the male.

From the content analysis of the review, it was found that no research work is being done, so far, in the universities of Saudi Arabia to study the impact of technology tools used by faculty on the academic learning environment. Hence, the objective of the present research is to find out the association between the tools of educational technology used by faculty members in classrooms that can create a positive impact on the academic learning environment.

Research Objectives:

Primary Objective

The main purpose of this study was to find out the association between educational technology and the academic learning environment in higher education in KSA.

Secondary Objectives

- To examine the characteristics of the respondents such as age, education, experience, primary language of teaching, class size, awareness of educational technology, integration of technology in teaching activities, and participation in training programs on educational technology.

- To identify the various educational technology tools used by faculty members in various colleges, and the most preferred and least preferred tool of technology among faculty.

- To conduct a survey on the use of educational technology in classrooms by faculty, and how it affects the various components of the academic learning environment.

- To give recommendations to universities for the better implementation of technology tools among faculty to create a positive impact on the academic learning environment.

Material and Methods

The type of research is descriptive in nature. Both primary, and secondary, data were used in this research. Secondary data was gathered by referring to research journals and suitable websites, while primary data was gathered through a structured questionnaire in the form of a survey. The universe of study is the female faculty of different women's colleges in KSA. Population means the total of individuals from which some sample is drawn (Ostle, 1963).

The population of this study included the faculty members of various women colleges of KSA, selected randomly. A total of 300 questionaires were distributed, out of which 254 were received, so the response rate was found to be 84 percent. The sample size of the study was 254 female faculty teaching in various women's colleges in KSA. The sample comprised assistant professors, associate professors and professors of various colleges. A restricted number to sample was taken, to ensure the smooth conduction of data collection and survey process. The purpose of data collection was to explore the current usage of technological tools among faculty members, and to study its impact, if any, on the academic learning

environment. To implement the study, dependent and independent variables were defined for the theoretical framework. The independent variable is educational technology. The academic learning environment is the dependent variable. The reason these two variables have been chosen is to see the relationship between them. The designed questionnaire was to conduct a survey to know the application of various technology tools implemented by faculty in the classroom, and to examine the effect of educational technology on the academic learning environment. The questionnaire included a total of 25 questions, and responses were recorded on a Likert scale type from 1 to 3, with disagree, neutral and agree. Data was collected personally by the researcher with the help of a self-designed structured questionnaire. Five experts from the fields of educational technologies, educational management, and statistics were asked for their views about the questionnaire for the validation process. The pilot study of the questionnaire was then conducted. Following the suggestions of experts and the preliminary applications, certain corrections and changes were made on the data collection tool, and the questionnaire was made ready for use for data collection. Both open ended and closed ended questions were used to conduct the survey. The data received from the respondents was analysed with the help of the statistical software program SPSS 22. Descriptive statistics like mean and standard deviation were used to analyse the data. A Pearson Correlation analysis was conducted to examine whether the hypothesis was accepted or rejected. Recommendations for creating better learning environment in universities are included at the end of research.

Hypothesis

H0"There does not exist a significant relationship between educational technology and the academic learning environment.

H1: "There exists a significant relationship between educational technology and the academic learning environment.

Results and Discussion:

Frequency Table

Table 1.1: Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	50+	37	14.6	14.8	14.8
	41-50	81	31.9	32.4	47.2
	31-40	121	47.6	48.4	95.6
	20-30	11	4.3	4.4	100.0
	Total	250	98.4	100.0	
Missing	System	4	1.6		
Total		254	100.0		

It was found that 14.8 percent of respondents were of the age group 50 years and above, 31.9 percent were within the age group of 41-50, 47.6 percent were of the age group 31-40 years, and 4.3 percent lie within the range of 20-30 years. Therefore, respondents from the age group of 30 years and above number the highest.

Table 1.2: Education

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DOCTORATE	106	41.7	42.4	42.4
	POST-GRADUATE	89	35.0	35.6	78
	GRADUATE	51	20.1	20.4	98.4
	OTHERS	4	1.6	1.6	100.0
	Total	250	98.4	100.0	
Missing	System	4	1.6		
Total		254	100.0		

Of the respondents, 41.7 percent were doctorate candidates, 35.6 percent of respondents were post-graduate, 20.1 percent were graduate and 1.6 percent had other qualifications like diplomas. Therefore the maximum amount of respondents were doctorates in education.

Table 1.3: Experience

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	15+	26	10.2	10.4	10.4
	11-15	73	28.7	29.2	39.6
	6-10	129	50.8	51.6	91.2
	1-5	22	8.7	8.8	100.0
	Total	250	98.4	100.0	
Missing	System	4	1.6		
Total		254	100.0		

Respondents having above 15 years of experience equalled 10.4 percent, 29.2 percent of respondents had 11-15 years of experience, 51.6 percent of respondents had 6-10 years of experience and 8.7 percent of the respondents had experience of 1-5 years. Hence it was found that most of the respondents had experience of 6-10 years.

Table 1.4: Primary language of teaching

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	4	4	1.6	1.6	1.6
	ARABIC	59	23.2	23.6	25.2
	ENGLISH	187	73.6	74.8	100.0
	Total	250	98.4	100.0	
Missing	System	4	1.6		
Total		254	100.0		

It was found that 23.2 percent of respondents use Arabic as the primary language to teach, while 73.6 percent of the respondents use English as the primary language to teach. Thus, the number of respondents using the English language as their mode of instruction were higher.

Table 1.5: Average class size

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	ABOVE 50	34	13.4	13.6	13.6
	40-50	175	68.9	70.0	83.6
	30-40	23	9.1	9.2	92.8
	LESS THAN 30	18	7.1	7.2	100.0
	Total	250	98.4	100.0	
Missing	System	4	1.6		
Total		254	100.0		

It was observed that 13.4 percent respondents teach to a class size of above 50, 68.9 percent of respondents teach a class size of 40-50 students, 9.1 percent of respondents teach in class a size of 30-40, 7.1 percent of respondents teach to a class size of less than 30. Hence the maximum number of respondents teach to is a class size of 40-50 students.

Table 1.6: Awareness about educational technology

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 4	2	.8	.8	.8
NO	26	10.2	10.4	11.2
YES	222	87.4	88.8	100.0
Total	250	98.4	100.0	
Total	254	100.0		

Of the respondents, 10.4 percent were unaware of various tools of educational technology, and 87.4 percent of the respondents were aware of various tools of educational technology. Respondents who were aware about recent tools used in educational technology were a larger proportion.

Table 1.7: Integration of technology in teaching activities:

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Mostly	203	79.9	81.2	81.2
	Frequently	21	8.3	8.4	89.6
	Occasionally	12	4.7	4.8	94.4
	Rarely	14	5.5	5.6	100.0
	Total	250	98.4	100.0	
Missing	System	4	1.6		
Total		254	100.0		

Of the respondents, 79.9 percent used technology tools most of the time in their teaching activities, 8.3 percent of the respondents used technology tools frequently, 4.7 percent of respondents used technology tools occasionally, while 5.5 percent of respondents used the technology tools rarely for their teaching activities.

Table 1.8: Attended training program on educational technology

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	4	1	.4	.4	.4
	NO	26	10.2	10.4	10.8
	YES	223	87.8	89.2	100.0
	Total	250	98.4	100.0	
Missing	System	4	1.6		
Total		254	100.0		

The table reveals that 10.2 percent of employees of the studied colleges have not undergone any training programme or attended a workshop or seminar on educational technology, while 87.8 percent of employees have undergone a training programme or attended a workshop or seminar on educational technology.

Table 2: Distribution of sample:

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	College of Humanities	50	19.7	20.0	20.0
	College of Sciences	50	19.7	20.0	40.0
	College of Health Sciences	50	19.7	20.0	60.0
	College of Community Services	50	19.7	20.0	80.0
	Visiting Faculty	50	19.7	20.0	100.0
	Total	250	98.4	100.0	
Missing	System	4	1.6		
Total		254	100.0		

The sample comprised of 50 faculty from the College of Humanities, 50 faculty from the College of Sciences, 50 from the College of Health Sciences, 50 from the College of Community Services and 50 visiting faculty were also included for the survey on educational technology. The College of Humanities included the faculty from the College of Education, the College of Arts, the College of Social Works, the College of Languages and the College of Arts and Design. The College of Sciences comprised of faculty from the College of Sciences, the College of Computer and Information Sciences, the College of Business Administration and the College of Engineering. The College of Health Sciences included the faculty members from the College of Nursing, the College of Health and Rehabilitation

Sciences, the College of Pharmacy, the College of Dentistry and the College of Medicine. Data was also collected from 50 faculty of the College of Community services.A survey was also completed by 50 visiting faculty of higher education of various departments.

Table 3: Descriptive statistics: preferred educational technology among faculty

	Mean	Std. Deviation	N
1. LMS-Blackboard	4.24	.885	250
2. E-Podium	4.01	.794	250
3. E-Attendance.	4.14	1.064	250
4. Course Management System	3.96	.791	250
5. Video Conferencing	4.22	.899	250
6. Interactive Board	3.98	.838	250
7. Virtual Learning Environment	4.10	.970	250
8. Collaborative learning Environment	4.01	.850	250
9. Web Based Instruction	4.02	.942	250
10. Smart Devices	4.08	.774	250
11. Mobile Learning	4.22	.752	250

The above table has been ranked on the basis of individual variable mean. It was found that most of the faculty preferred the Blackboard-Learning Management System, as it has got highest mean of 4.24. In most of the colleges, E-Podium was used by faculty members, as its mean value was found to be 4.01. Faculty of various colleges in KSA also make use of E-Attendance, video conferencing, interactive board, smart devices, mobile learning, web-based instruction, collaborative learning environments, and virtual learning environments. However, the Course Management System (CSM) was found to be the least preferred technology among faculty members, with a mean of 3.96.

Table 4: Faculty opinion on effect of educational technology on the academic learning environment

ACADEMIC LEARNING ENVIRONMENT	Mean	Std. Deviation	N
1. Class room atmosphere	4.08	.654	250
2. Better understanding of concepts	4.28	.822	250
3. Better evaluation procedure	4.26	.855	250
4. Better student connectivity	4.08	.738	250
5. Better problem solving	4.02	.766	250

6. Enhanced student engagement and motivation	4.18	.844	250
7. Increased academic grade	4.17	.743	250
8. Task orientation	4.14	.817	250
9. Better feedback mechanism	4.09	.846	250
10. Student cohesiveness	3.98	1.064	250
11. Congruence with teaching plan	3.88	.926	250
12. Equity	4.22	.752	250
13. Quality of teaching	4.26	.775	250

The above table explains the faculty opinion on the effect of educational technology on the academic learning environment. It was found that educational technology had a positive impact on various components of the academic learning environment. On the basis of mean, it was found that educational technology created the highest impact on the understanding of concepts by students, and on evaluation procedures done by faculty. It enhanced the quality of teaching or instructions, and promoted equity in communication between the faculty and the student. It also created a reasonable positive impact on the class room atmosphere, student connectivity, faculty problem solving skills, enhanced student engagement and motivation, increased academic grade, task orientation, and better feedback mechanism. However, it had a comparatively less effect on student cohesiveness and congruence with the teaching plan.

Table 5.1 Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.856	.858	11

A reliability test for educational technology scale was done through Cronbach's Alpha. Eleven items were included and Cronbach's alpha was determined as .856. The alpha value, which was detected as higher than the threshold value of 0.7, proves that the research scale was clearly understood by the participants and the questions in the scale were not inaccurate.

Table 5.2 Reliability statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardised Items	N of Items
.837	.839	13

A reliability test for the academic learning environment scale was conducted through Cronbach's Alpha. Thirteen items were included and Cronbach's alpha was determined as .837.The alpha value, which was detected as higher than the threshold value of 0.7, proves that the research scale was clearly understood by the participants and the questions in the scale were not inaccurate.

Table 6. Correlation analysis

		EDUCATIONAL TECHNOLOGY	ACADEMIC LEARNING ENVIRONMENT
TOTAL EDUCATION TECHNOLOGY SCALE	Pearson Correlation	1	.619**
	Sig. (2-tailed)		.000
	N	254	254
TOTAL ACADEMIC LEARNING ENVIRONMENT	Pearson Correlation	.619**	1
	Sig. (2-tailed)	.000	
	N	254	254

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

From the above table it is found that there exists a significant positive correlation between the technology used by faculty members in the class room and the overall academic learning environment, r=0.619, p<0.01. Hence the null hypothesis is rejected and the alternate hypothesis is accepted, that there is a significant relationship between educational technology and the academic learning environment.

Conclusion:

Based on the preceding analysis and discussion, it can be concluded that educational technology implemented by the faculty of various colleges in KSA created a significant impact on the academic learning environment in the class room.

Recommendation:

The availability of technology resources alone cannot guarantee the effective implementation of technology in education. Universities need to develop and modify their traditional academic structure in order to effectively utilise the technology tools in teaching and learning. Academic achievement cannot be improved by technology on its own. Universities and institutions must provide adequate training, and must ensure there are sufficient infrastructure resources for the effective implementation of educational technology tools. Educators may not always have access to computers, since resources are shared in most institutions of learning. Technical and management support is also essential in the successful implementation of educational technology at various levels. Counselling sessions must be organised by system administrators to change teachers' negative attitudes towards educational technology. Educational policy must be framed to overcome the barriers to the effective utilisation of technology, such as cultural and social factors. Regular evaluation must be done for the successful implementation of technology tools in class rooms.

Limitation of research:

This research is confined to the selected women's colleges of KSA. The data was collected to know the faculty opinion for one academic session only.

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