THE IMPACT OF TECHNOLOGY AND DISTANCE LEARNING ON THE FUTURE OF EDUCATION IN SAUDI ARABIA

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Abstract

The study assesses how application of technology and distance learning will affect the future of the educational system in Saudi Arabia. Systematic Literature Review (SLR) methodology is used, to collect data on the interrelationship that exists between technological tools and the growth of the educational sectors. The Wedmeyer's theory of independent study and the innovation-diffusion theory were used as guiding principles forming the study's Conceptual Framework. The main research instrument utilized is a carefully designed research instrument and a snowball sampling technique has been implemented. Based on the data collected, the study has established that the application of technology and distance learning practices will affect the Saudi Arabian educational system in three ways. First, there will be a shift in the learning environment that students are exposed to. Secondly, there will also be an improvement in infrastructure-related factors that are associated with distance learning. Lastly, there will be an enhancement in instructor characteristics. Based on these findings, the study recommends that the Saudi Arabian government should invest in enhancing existing technological infrastructure along with the training and development of instructors.

Keywords: Technology and Distance Learning, Innovation-diffusion Theory, Systematic Literature Review, Wedmeyer's theory of independent study, Saudi Arabia

1. Introduction

In this study, the future of the education system will be assessed concerning a change in the availability of infrastructure, the characteristics of instructors, and the quality of the learning environment that students operate in. An assessment of these factors is critical to understanding the influence of technology and distance learning practices on the future of the educational system in Saudi Arabia.

Furthermore, the quality, reliability, and richness of the medium are the critical infrastructural aspects of delivery. In particular, infrastructure supports synchronized exchanges, increased convenience and accessibility of information by students, and the existence of minimum document-exchange periods. Omito et al., (2016) identified that the ability of IT infrastructure to support the provision of rapid interactions that are compelling while also allowing students to receive feedback, is one of the strengths of interactivity within a web environment. Engagement is considerably affected by the presentation of materials that are utilized in education and their challenges.

The main contributions of this study are the following: a) creates awareness on the influences of technology and distance learning practices on the future of the educational system in Saudi Arabia, b) explains why the Saudi Arabian government should invest in enhancing existing technological infrastructure along with the training and development of instructors

The study's main aim is to establish a proper comprehension of the topic under study and act as a proper guideline for the collection of data. The research objectives of the study are:

- to evaluate how the application of distance learning and technology will affect the learning environment that students are exposed to.
- to establish how the application of distance learning and technology will affect the quality of infrastructure available in the Saudi Arabian education system.
- to assess the influence that the delivery of distance learning and technology will have on instructor characteristics.

2. Literature Review

2.1 Development of Technology and Distance Learning in Education

Studies on distance learning in higher education indicate an increase in the use of information and communication technologies (ICTs) for course delivery (Leontyeva, 2018). Distance learning and ICTsare interrelated, resulting in a growing market for online distance learning at different levels of the education system. Moreover, increased enrolment in online courses has demystified distance education with expanded access to the internet revolutionizing the educational landscape (Elshami, 2018). The constant concern by educators to achieve better learning outcomes, meet expectations and, growing demand for new educational services have allowed for the emergence of innovative methods of learning. New approaches have been identified to improve the learning experiences of integrated technology within educational systems (Bozkurt, 2019).

The application of technology has undoubtedly provided students with extensive access to learning as opposed to traditional learning environments (Martin et al., 2018). This access is because students at different levels of the education systems can access their education materials from any educational institution within and beyond their geographical areas (Bozkurt, 2019). Additionally, this has provided students with the opportunity to continually access educational opportunities despite any changes in their localities or environment (Zaborova et al., 2017). Moreover, students that formerly could not access education can use distance-learning practices to support this accessibility.

2.2 Distance Learning in Saudi Arabia

The increasing significance of technology in the instructional and learning environments is evident with the Saudi Arabia educational system (Almarashdeh et al., 2016). Based on the National Plan for Information Technology (NPIT), the education system in KSA was guided by the vision of empowering people through innovative learning in continuous education (Al-Juda, 2017).

According to Al-Juda (2017), the utilization of different forms of technology within the educational environment in KSA started in the 1990s. This was followed by a range of projects which involved the application of technology services to schools and educational centres. It also included the design of new curricula to fit these changes along with the development of the capabilities of both the students and the teachers (Alahmari, 20170. The country's education system is now characterized by the increased application of technological training and resources while also promoting the use of e-learning programs for learners and instructors (Alzahrani, 2017). To compete with the global activity of providing online access to educational resources, a majority of universities within the Saudi Arabian higher education sector have enhanced their focus on e-learning while also attempting to replace their entire curricula with distance learning materials.

The need for the application of distance learning practices in KSA, is a result of an extensive expansion in its population numbers. Distance learning practices act as an affordable way to support this expansion without calling for the construction of physical infrastructure (Alahmari, 2017). This expansion has resulted in an inadequate capacity of faculty members, and the need of reducing associated costs. There is also a need to coordinate approved programs, training activities, and the creation of educational resources. Due to the extensive population growth that the KSA has experienced over the years, there has been an increased demand for education. Other factors that increase the demand for educational opportunities involve an absence of the

integration between the growth of Saudi Arabia universities and the increase in enrolment demand, and the increasing obsolescence of existing knowledge (Almarashdeh et al., 2016).

However, most of the educational institutions suffer from a shortage of well-qualified instructors and there have been rising costs of schools (Al-Juda, 2017). These issues have established the need for an approach to learning that is based on collaboration in educational systems, which is mainly conducted using distance learning practices. The decreased quantity of lecturers in these institutions, is made worse by the over-enrolment of students increasing the need for independent learning (Alzahrani, 2017).

2.3 Potential Benefits of Technology and Distance Learning to the Saudi Arabian Education System

Investment in education has become a substantial priority for the Saudi government which has allocated a considerable portion of the budget for education. This budget allocation has allowed for technological advancements to be interwoven into the country's educational system. According to Alzahrani (2017), distance learning practices present several benefits to the educational system. this includes substantial improvements to the teaching and learning process such as improving the development of learning capabilities by simplifying the gathering of information. Other benefits include improving the motivation of students, increasing opportunities for students with special needs, and acting as a catalyst for changes within the educational system. the role of technology has been important for enhancing the learning for students while assisting teachers with the ability to communicate with students efficiently (Aldiab et al., 2017).

There has been an increased accessibility of technology to students due to its integration in different sections of society (Al-Juda, 2017). Most female learners have been increasingly able to access education opportunities even when in remote areas (Alahmari, 2017). Additionally, there has been a rise in the number of graduates and instructors within the higher education institutions in the country. With a population that has become highly skilled, the KSA has been able to use its education system to diversify and expand its economic status.

3. Theoretical Framework

The application of technology in education along with distance learning practices has resulted in the emergence of several theories that are suggested to explain distance learning (Giossos et al., 2009). The theories applied in this study are Wedmeyer's theory of independent study and innovation-diffusion theory.

3.1 Wedmeyer's Theory of Independent Study

According to Wedmeyer, the separation of teaching and learning was a form of minimizing space and time limitations (Fotiadou et al., 2017). This theory provides a look into the different changes in an education system that occur as an outcome of the application of technology and distance learning practices. This view is provided through Wedmeyer's emphasis on six characteristics that define the independence presented by distance learning practices (Bernardo et al., 2010). These characteristics include; 1) the separation of the students and teachers, 2) common learning and teaching processes are carried out through writing or other channels, 3) the industrialization of teaching, 4) learning takes place through activities by the students, and increased convenience in learning, and the increased responsibility of the learner over the speed of learning.

3.2 Innovation-Diffusion Theory

The innovation diffusion theory, which was developed by E.M Rogers in 1962, acts as one of the oldest social science theory (Bakkabulindi et al., 2018). Rogers defined innovation as ideas, practices or objects that are perceived as unfamiliar by users. Innovation diffusion then is used to refer to the procedure through which individuals transfer from prior knowledge of innovation to establishing attitudes concerning innovation, to making decisions on adopting or rejecting innovation.

Rogers identifies that there are five main attributes, which affect the degree of acceptance. The first attribute is relative advantage, which refers to the level to which innovations are viewed, as being better, that existing ideas.The second attribute is compatibility, which discusses the level to which innovations are viewed as bearing consistency with current values. The third attribute is complexity and the fourth is the extent to

which innovations can be tried on a specific period. The last attribute, which is observability, refers to the level at which the outcome of innovation can be viewed by others (Akman et al., 2017).

4. Research Methodology

4.1 Research design

This study uses a systematic literature review (SLR) design based on qualitative methodology. Systematic reviews present objective summaries on what has been written and identified concerning a research topic. Systematic literature reviews differ from traditional reviews in several ways. Okoli et al., (2010) state that the main distinction exists in the level of representation as SLRs are more focused on providing a full overview of research carried out on a specific field until the present date while traditional reviews are based on a specific selection of studies. In an SLR, all research procedures have to be explicitly defined before the review can be conducted to make the review more reliable (Brereton et al., 2007).

The first step in the review was the operationalization of the research objectives in the research process. The first objective concerning the impact of technology and distance learning practices on the future of education in Saudi Arabia has been operationalized as shifts in the educational system over time.

The second objective regarding the application of distance learning and technology was assessed against the various tools and technologies that have been applied in the Saudi Arabia educational system. The third objective the effect of the application of distance learning and technology on the quality of infrastructure was assessed against the development of quality in the education system. The last objective, which concerns the delivery of distance learning and technology and its impact on instructor characteristics, was evaluated based on the acceptance and adoption of technology by instructors.

4.2 Research Instrument

In this SLR, the research instrument is regarded as the search strategy employed to identify the right sources. To develop an effective strategy, the framework outline by Kable et al. (2012) was used. The search strategy was first formulated by formulating a purpose statement. The purpose of the research was formulated by the researcher based on the identified field of interest. The purpose was described as the identification of the impact that technology and distance learning practices would have on the future of education in Saudi Arabia. An all-encompassing overview of this impact would be derived, as opposed to focusing on limited research topics (Mengist et al., 2020).

The second aspect of the search strategy involved the identification of appropriate databases. A combination of four research databases was used to identify the appropriate articles to be used in the study. The databases used include the Education Resources Information Center (ERIC) which is a well-structured database of full-text education literature and resources and Education Research Complete, which is also an extensive database for educational literature and resources. The last two research databases are the Academic Search Ultimate which provides a collection of peer-reviewed and full-text journals and PsycINFO which presents scholarly articles in psychology and education.

4.3 Sampling Method

A snowball sampling technique was utilized for the SLR. As it is a non-random technique, this technique was used to enable the researchers to reach more literature resources (Etikan, 2016). The technique was chosen for the study as it would facilitate the easy identification of documents related to the research topic. For this technique, search limits were established and applied to the searches (Kendall et al., 2008). The first limit was that all sources were to be peer-reviewed journal articles in the English language. The second limit was that all the journals included should be published between 2010 and 2020. A time frame of ten years was selected to provide the researcher with the ability of assessing the impact on the field. For each of the databases, the search terms were limited to the title, abstract, and keywords of the article. The fourth limit was the subject area. For all database searchers, there was a restriction of the subject area to education and technology.

5. Findings
5.1 General Findings

The purpose of conducting a literature study was to establish the impact of distance learning and technology on the future of the education system in Saudi Arabia. The themes presented in this review are (1)

the learning environment, (2) the quality of infrastructure-related factors, and (3) the instructor characteristics. The complete list of selected published papers is presented in the Table 1.0 below.

Table 1. List of Published Papers

Author	Title	Year	Country
Akman et al.,	Examining Technology Perception of Social Studies Teachers with Rogers' Diffusion Model	2017	Global
Al-Khalifa	The state of distance education in Saudi Arabia	2017	Saudi Arabia
Aldiab et al.,	Prospect of eLearning in higher education sectors of Saudi Arabia: A review	2017	Saudi Arabia
Alharbi	E-learning in the KSA: A taxonomy of learning methods in Saudi Arabia	2013	Saudi Arabia
Aljabre	An exploration of distance learning in Saudi Arabian universities: Current practices and future possibilities	2012	Saudi Arabia
Al-Juda	Distance Learning Students' Evaluation of E-Learning System in University of Tabuk, Saudi Arabia	2017	Saudi Arabia
Almaiah et al.,	Analysis of the effect of course design, course content support, course assessment, and instructor characteristics on the actual use of the E-learning system	2019	Saudi Arabia
Almarashdeh et al.,	Investigating the acceptance of technology in distance learning program	2016	Saudi Arabia
Alsabawy et al.	Determinants of perceived usefulness of e-learning systems.	2016	Global
Alzahrani	The Developments of ICT and the Need for Blended Learning in Saudi Arabia.	2017	Saudi Arabia
Bakkabulindi	ELECTRONIC READINESS OF ADMINISTRATORS IN MAKERERE UNIVERSITY: A TEST OF ROGERS'INNOVATION DIFFUSION THEORY.	2018	Uganda
Bernardo et al.,	E-Learning at Universidade Alberta: an empirical study applied to management courses.	2010	Portugal
Bozkurt	From distance education to open and distance learning: A holistic evaluation of history, definitions, and theories.	2019	Global
Davies et al.	Creative learning environments in education—A systematic literature review.	2013	Global
Elshami et al.,	Acceptability and potential impacts of innovative E-Portfolios implemented in E-Learning systems for clinical training.	2018	Saudi Arabia
Fotiadou et al.	Learner autonomy as a factor of the learning process in distance education.	2017	Global
Leontyeva	Modern distance learning technologies in higher education: Introduction problems.	2018	Global
Martin et al.	Engagement matters: Student perceptions on the importance of engagement strategies in the online learning environment.	2018	Global
Moore et al.	Distance education and technology infrastructure: Strategies and opportunities.	2018	Global
Omito et al.	E-learning access and infrastructure in distance learning institutions; a case of University of Nairobi, Kenya.	2016	Kenya
Orhan Goksun	Predictors of Perceived Learning in a Distance Learning Environment from the Perspective of SIPS Model.	2020	Global
Papamitsiou et al.	Learning analytics and educational data mining in practice: A systematic literature review of empirical evidence.	2014	Global
Zaborova et al.	Distance learning: Students' perspective.	2017	Global

Based on the systematic literature review, the increased use of distance learning and technology within the higher education sector of Saudi Arabia will considerably affect the structure of the sector. This effect will be observable in three elements: a shift in the learning environment, the quality of infrastructure, and the instructor characteristics. The results are showcased in the table 2.0 below.

Table 2. Description of Components

Components	Description	References	%
Learning Environment	Accessibility of Learning Environment	1,2,3,8,14,15,16,17,18,20,22,23,24	54%
Infrastructure	Quality of Infrastructure-related factors	1,4,5,6,7,9,10,11,12,13,17,18,19,20	58%
Instructor Characteristics	Improved Instructor Characteristics	2,4,7,8,11,15,21,22,23	38%

5.2 Learning Environment

A majority of the studies established that distance learning would result in several shifts within learning environment. While assessing the impact that the use of distance learning practices and technology would have on the Saudi Arabian educational system, an assessment of the learning environment was necessary. According to the sources, distance learning would not affect the learning environment by enhancing the quality of the content and learning environment but also by enhancing the number of opportunities within the learning environment. Almarashdeh et al. (2016) The three main factors ide.ntified across the sources were accessibility, flexibility, and communication.

5.3 Infrastructure

In the assessment of the ways in which the Saudi Arabian educational system would be affected by the increased application of technology and distance learning practices, there was an evaluation of the infrastructure utilized and the related factors. Fourteen of the sources established that the increased use of distance learning practices and technology would have an impact on the infrastructure utilized in the educational system. Specifically, there was attention paid to a number of infrastructure-related factor

5.4 Instructor Characteristics

In the assessment of the impact of distance learning education and technology on the future of the Saudi Arabian education system, an evaluation of existing actors was necessary. As instructors are responsible for ensuring that there is proper distribution of information to learners within the existing environment, an analysis of how they would be affected by the increased application of distance learning practices and technology was necessary. The three main factors that were established included the teaching styles, the quality of instructors, the scaffolding abilities.

6. Discussion

In this section, there will be an extensive discussion of the findings from the systematic literature review conducted. The first area is the learning environment, which describes the form learning utilized within the educational system, while the second area is infrastructure-related factors, which refer to the quality of information distributed. The last area is instructor characteristics, which refer to the competencies, skills, and capabilities of instructors concerning the use of technology and the creation of effective learning communities.

6.1 The learning environment

Distance learning in Saudi Arabia has considerably changed the landscape of the learning environment. The learning environment is a term used to define the instruments and form of learning utilized within an educational system (Alharbi, 2013). Within the Saudi Arabian higher educational system, the existing demand for educational opportunities far exceeds the existing demand. The increased application of distance learning technologies is expected to provide students with more access to learning opportunities that are currently available through traditional learning environments.

Moreover, students from across the country will gain the ability to consistently access educational opportunities despite any shifts that may occur in the environment. The existence of gender and cultural divide within the Saudi Arabian educational system has resulted in the heightened restriction of some students within the educational environment. The use of distance learning procedures will mean that students who could not formerly access educational opportunities can use distance learning procedures to study at their own convenience (Davies et al., 2013). The competencies provided by the internet and technological platforms have resulted in the unlimited availability of enhanced informational materials to students.

Online platforms will also be mainly utilized to support communication between learners and their colleagues as well as between students and their instructors (Martin et al., 2018). The utilization of digital

resources for learning activities and processes will also become increasingly common within the education system.

6.2 The quality of infrastructure-related factors

The use of distance education practices and technology is expected to act as a catalyst for policy and investment in technological infrastructure within the Saudi Arabian education system. For technology and distance learning practices to be applied within the education system, the quality of the infrastructure available is a considerable determinant. Infrastructure-related factors include the ease of sharing information, the level of support obtained by students from the software, and the quality of the information presented (Leontyeva et al., 2018).

The use of technology and distance learning practices is expected to increase the transfer of knowledge across the education sector (Martin et al., 2018). E-learning platforms are expected to increase community and peer learning, along with the level of information shared across the education system. Participation within technological forums such as forum discussions provides students with the opportunity of collaborating and engaging with each other.

Improved infrastructure will also help the faculty in establishing enhanced course design (Mengist et al., 2018). Course design affects the satisfaction of students and their perception of learning activities. The increased application of technology and distance learning practices will support the increased integration of online activities with practices, resulting in the better preparation of teachers. This will enhance the level of collaboration that exists between learners and instructors will result in deliberate course design (Leontyeva et al. 2018).

6.3 The Instructor Characteristics

The application of distance learning practices is expected to have a significant effect on the instructors in the Saudi Arabian education system. One instructor characteristic that will be affected is the quality of instructors, which refers to the ability of the instructor to make clear presentations (Bakkabulindi, 2018). Through the application of technological platforms and distance learning procedures, the quality of instructors will be enhanced, resulting in better learning presentations to students.

Another characteristic that is expected to change is the teaching styles that will be utilized by instructors within the educational system. Due to the shift from a traditional learning environment to an online environment, instructors within the Saudi Arabian educational system are expected by the government to use highly interactive teaching styles. As already discussed, the learning environment will be highly interactive with increased collaboration between learners and instructors on different online platforms.

Instructors within the Saudi Arabian educational system will be increasingly required to scaffold students to enable their successful participation in online discussions. Educators will be able to successfully scaffold the online discussions of students in regards to quantity, the interval of student interactions and quality, the ability of students to provide and structure contextual information (Alahmari, 2013). To be able to facilitate teaching and learning within the environment of distance learning environment, instructors will be expected to have a combination of roles and responsibilities. Instructors will learn to increase their availability to students while minimizing the level of student isolation.

Due to the dynamic learning environment resulting from the increased adaptation of distance learning practices and technology, instructors will have to learn ways of constantly adapting to the changes that occur. Instructors will increasingly be required to have the knowledge needed to effectively provide instructional support within the new learning environment (Elshami et al., 2018).

7. Conclusions and Limitation

The study was mainly conducted through a systematic literature review methodology to explore data associated with three research objectives outlined. The first objective was to evaluate how the application of distance learning and technology will affect the environment that students are exposed to. The second objective was to establish how the application of distance learning and technology will affect the quality of infrastructure available in the Saudi Arabian education system. The last objective was to assess the influence that the delivery of distance learning and technology will have on instructor characteristics. A search strategy was used as the instrument to identify the appropriate sources. The search strategy included the identification

of appropriate databases that were used to carry out efficient searches. A snowball sampling technique was utilized through which a chain referral process was used to find the appropriate literature.

Studies on distance learning in higher education establish an increase in the utilization and application of technology within the different educational systems (Alahmari et al., 2017). The expansion and growth of technological advancements have resulted in increased connectivity of educational processes and practices within different learning environments. The adoption of e-learning platforms has been identified as providing students with greater flexibility in regard to learning choices (Martin et al., 2018). Currently, the Saudi Arabian education system is defined by increased demand for educational opportunities and decreased supply (Alahmari et al., 2017). The heightened application of distance learning technologies will result in many students gaining the capability to consistently access educational opportunities despite any changes that may take place within their learning environment. Students and learners are expected to have greater control over their learning processes and higher autonomy over the learning practices that they engage in.

Secondly, the study established that the use of distance learning practices and the application of the technology would result in the advanced quality of infrastructure-related factors. In this study, infrastructure-related factors are identified as the ease of sharing information, the amount of support that students receive from software, and the quality of information that is provided. The use of distance learning and technology will enhance the ease of sharing of information by increasing the sharing of knowledge between students, faculty, and other stakeholders.

Thirdly, the application of these distance learning practices and technology will also result in a shift in the instructor characteristics. The use of distance learning practices by instructors is expected to enhance the ability of instructors to make effective presentations resulting in a better learning environment for learners. There is also expected to be a change in the teaching styles that teachers and instructors utilize within the system. Based on the shift from a traditional environment to an online-oriented environment, instructors will be expected to utilize teaching styles that support increased collaboration and interaction.

The main limitation was the absence of a prior research study conducted on the topic. During the SLR, there was a wide range of sources identified concerning the application of ICT tools and distance learning practices within different educational systems. However, there was no prior study conducted addressing the impact of distance learning practices and technology on the future of the educational system in Saudi Arabia. Due to the absence of prior research addressing this topic, the study had to utilize an exploratory design. The impact of this limitation was minimized by utilizing a wide scope of resources in the collection of data.

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