A Survey On Educational Technology In Saudi Arabia

*Hayah M. Abouelnaga, #Hayam Abouelmagd, *Ahmed B. Metwally, #Sanaa Alsmadi, and **Loqman A. Mazouz

#Libraries and Information Department, College of Arts, Imam Abdurrahman Bin Faisal University, Al-Dammam, Saudi Arabia
*General Courses Department, College of Arts, Imam Abdurrahman Bin Faisal University, Al-Dammam, Saudi Arabia
**Finance Department, Imam Abdurrahman Bin Faisal University, Al-Dammam, Saudi Arabia

ABSTRACT: Educational technology is the use of both software, physical hardware, and educational theoretic to facilitate learning and improving performance by using, creating, and managing appropriate resources and technological processes. The present descriptive paper discusses the fairly new phenomenon of e-learning that is emerging in Saudi Arabia (KSA). The fundamental phases and switches towards e-education in general are discussed in this paper. The usage account of educational technology in this country since the mid-1900s is highlighted, specifically on the initial phase, the progressions, and the present status. The dramatic increase in technology application in schools, institutes and universities is described as well. Also, the present paper examines the attitudes of Saudis towards this worldwide phenomenon. Past works on e-leaning/e-education in the Saudi Arabian context is reviewed as well.

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1. INTRODUCTION

Saudi Arabia is an immense county covering nearly all of the Arabian Peninsula [1], and following the oil discovery in 1930s, the country began to progress socially. The national economy of Saudi Arabia is pillared by oil, and according to Abir in [2], oil make up 90% of its exports and 70% of its national production.

The income generated from oil is partly used in the construction of transportation systems, communication networks, and better homes, and in the provision of electricity to remote rural regions. It is also used in building modern schools. In this country, prior to the introduction of the Directorate General for Education in 1930, *Kuttab* was the only recognized education. As described in Elyas and Picard [3], *Kuttab* is a system of education whereby teachers teach their students in their home environment or in the community mosques.

Rugh in [4] reported that owing to the size of the country, which is colossal, in addition to deficient funds, education in this country became highly restricted quantity and quality-wise, two decades later. This has led to a significant illiteracy rate, dearth of facilities and nearly non-existent skilled native teachers. Students never went beyond 30,000 in number during this period. However, in 1954, a year after the establishment of the Ministry of Education, the number nearly doubled. Then, the year 1960 and onwards saw the successful execution of plans and efforts to expand education all over the country. In regards to education among females in Saudi Arabia, Mahboob and Elyas in [5] stated that it is among the fastest developing areas of social development.

2. Education Facilities & Technology Implementation

The growth of education facilities in Saudi Arabia has been rapid and the government has been generous in the funds allotment. Somehow, education in this country has not been fulfilling all expectations [6]. In fact, the 1980-1985 Saudi Third National Development Plan made a highlight on the previous plan. The physical facilities of education and training systems in this country significantly expanded during the Second Development Plan but there appeared to be issues concerning the location of facilities, equipment, and maintenance [6]. Also, their delivery and design are frequently expensive as well as poorly adapted to educational purpose.

A number of reforms have been attempted. Somehow, the success has been minimal. Accordingly, the Third National Development Plan has highlighted the incorporation of educational technology within the educational network. As stated, the current circumstances imply some improvement prospects in qualitative programs, especially in the execution of main development projects including multi-purpose classrooms, Educational Television, and Educational Technology Centre [6-8].

3. The True Start of Educational Technology

Saudi Arabia is consistently prioritizing the efforts towards Educational Technology implementation. In fact, the introduction of new learning material was prioritized in the Second national plan (1975–1980) and the Third (1980–1985) national plan. Meanwhile, the attainment of quality in education[6] outcome was one of the objectives of the fourth national plan (1985–1990). Appositely, the former Deputy of the Ministry of Education highlighted the importance of using instructional media among teachers.

Saxena in [9] accordingly mentioned the lack of confidence and enthusiasm among teachers in regards to the practicality of audio-visual aids as their substitute means of instruction. In Saudi Arabia, there was no Educational Technology before the Ministry of Education established a small audio-visual unit in 1959, as reported by the International Yearbook of Education [6]. Then, the unit of graphic and illustrations for restricted generation of slides, prints of silk screen, photography, filmstrips, and transparencies was introduced between 1964 and 1971. Such introduction significantly transformed the education in the country. Furthermore, the government of Saudi employed the recommendations from foreign experts and also cooperated with them in the implementation of Educational Technology [6]. Among the bodies that have cooperated with Saudi Arabia in education related matters include Indiana University (1975) and Wade Media Consultant, Inc. (1973).

Several means have been applied in introducing Educational Technology in Saudi education, such as teacher training programs as well as the development and utilization of novel instruction methods. Other means include the scheming and generation of software materials and these materials can be accessed by the public through radio and television stations [10, 11].

4. Government Determination to Implement Educational Technology

General Administration for Educational Technology was introduced in 1985, and it is part of the new Educational Development Department. The introduction significantly transformed the system of education in the country [11]. Accordingly, the newly introduced administration comprises a design unit and a production unit. The administration unit covers the following accountabilities:

1. Provision of in-service training for Educational Technology leaders.
2. Generation of Instructional materials for a vast range of educational courses.
3. Provision instructional films, equipment and the materials for science and mathematics labs.
4. Provision of PC and computer hardware and software to schools.
5. Establishment of a unit that enables the copying and recording of instructional videos and audio tapes.

From 1976 to 1982, the Ministry of Education of Saudi Arabia had spent a whopping 281,658,489 SR for just the instructional media, materials and equipment, and this undeniably denotes the determination of Saudi Government in regards to the implementation of Educational Technology in the country [11].

Figure 1 shows that the education system in Saudi Arabia contains of several learning stages for both girls and boys (segregated education), starting with the primary stage [12].

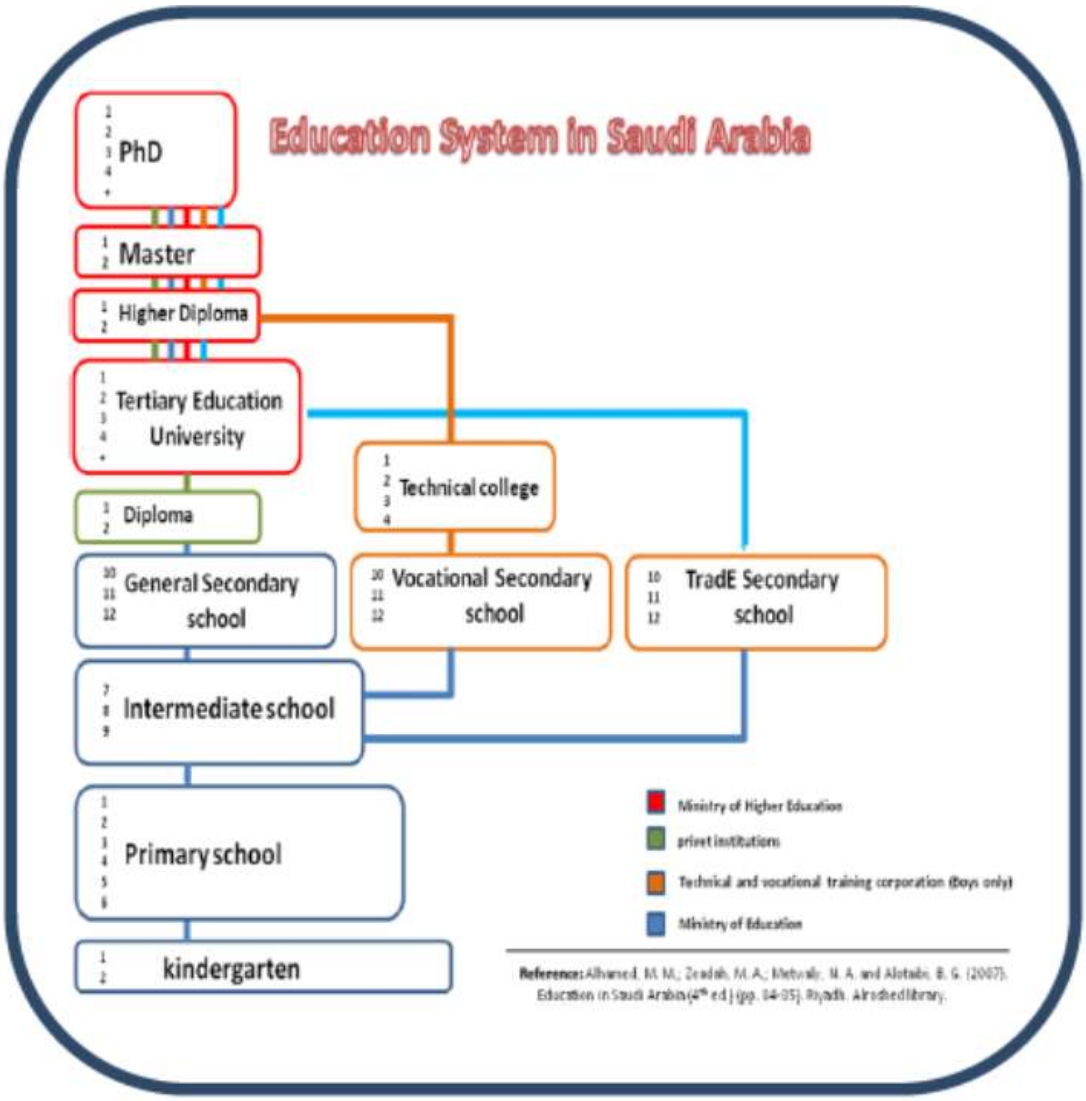

Figure 1: Education system in Saudi Arabia [12].

The intermediate level lasts for 3 years and then, 3 years of high school. At the undergraduate level, both genders can continue their education; the bachelor usually takes 4 years or longer depending on the major of the study. After that, the postgraduate level includes Master's level, which takes about 2 years, and four years of doctoral study or more. There are also many colleges and institutions accessible that provide students with opportunities to engage in fields of commerce, medicine, technical work or industry.

5. Blended Learning

In Saudi Arabia, young learners are being exposed to countless of technologies on a daily basis. The constant concerns among educators towards the attainment of superior learning outcomes and the fulfillment of expectations and demand have led to the birth of innovative learning methods. In their study, Lopez-Perez et al. in [13] reported the discovery of novel approaches which involve the incorporation of technology within the educational system that improves the learning experience of students. However, as reported in Graham in [14], these two environments were divided for a lengthy duration of time.

The business world was the pioneer to the blended learning concept. As explained in Sharam and Barrett in [15], the application of the concept allows employees to simultaneously work and attend courses with the use of the platforms. Blended learning encompasses a language course that includes a component of face-to-face (F2F) classroom

combined with the correct technology application [15]. It also can be described as the incorporation of online and face-to-face instruction [14].

In essence, blended learning entails the conventional and innovative learning combined, and such combination allows the information and communication to be dispersed. Comparatively, face-to-face learning is grounded upon the conventional class setting, and as indicated in [14], such learning needs the physical presence of a teacher. On the other hand, blended learning focuses on self-learning and interaction that take place within an asynchronous environment. Macdonald in [16] described such learning style as the integration of classroom methods with the utilization of online activities.

As such, blended learning is an appropriate accompaniment as well as enrichment to the conventional learning [13]. In fact, blended learning is not an alternative to conventional learning. The use of blended learning is beneficial to both learning methods. According to Barrs in [17], this style of learning not only boosts, but also strengthens self-learning, and thus, learners' autonomy is increased as they can gain access to information much easier. This learning style is flexible as it provides the corresponding self-study material as well, and therefore, this fulfills the needs of language-learning [13, 15]. Aside from decreasing the associated costs, blended learning also eases learning. Lopez-Perez et al. in [13] accordingly reported that learner's age, background and motivation level dictate their technology acceptance and benefit.

Technology progresses all the time. As for blended learning, it has been predicted that it will be expanded to more courses for its ability to allow user connectivity at any time, place or pace [18]. Learning is beyond a one-time event-learning because as suggested in [19], it encompasses a process that is continuous. Singh in [19] further highlighted the different forms of blended learning including knowledge management systems, real-time virtual/ collaboration software, and self-paced web-based courses. However, Garrison and Kanuka in [18] pointed that in the context of higher education, the learning environment transformation is yet to be completely attained among the various learners. Sharam and Barrett in [15] indicated that blended learning concerns with the manner in which the technology is effectively and naturally combined.

6. Emergence of Technical Education in Saudi Arabia

In regards to the progress of education in Saudi Arabia, the phases have been steady. This has allowed the adaptation of the country into the spontaneous and swift needs for modernized sector of education [6]. Among the education related changes that took place in Saudi Arabia are as listed below:

1. Early 1950s – The onset of the integration of technical education and vocational training with general education.
2. 1980 – The formation of General Organization for Technical Education and Vocational Training (GOTEVOT) to address the requirement of technological education at the college level to generate high quality workforces.

7. Pre-internet Technology & Education in KSA

In KSA in 1979, the Ministry of Higher Education and the Ministry of Education collaborated to produce education programs broadcasted through the country's radio channels. These programs had undeniably helped students in their conventional learning system albeit not officially distance learning programs [6, 20]. Then, in 1980, Saudi Arabian students took part in courses organized by international universities overseas. This marked the era of correspondence education in KSA. Next, ArabSat which encompasses two communications satellites was launched in 1985 by several Arab countries including Saudi Arabia. Albalawi in [20] indicated that the use of ArabSat in the context of education is vast.

8. Post-Internet Technology & Education in KSA

King Fahd University of Petroleum and Minerals (KFUPM) in Dhahran started to have Internet connection in 1993, making it the first university with the Internet connection. The following year saw the use of the Internet among the academic, medical and research institutions in KSA. Meanwhile, the public began having access to the Internet in 1997 [6]. In the following two years (1999), the Internet was already available for use for both the government and college. Then, Internet access eventually shifted to the mainstream from the government and the academics, and after the non-significant progress within the first few years, Internet subscription and use began to dramatically increase [6].

As indicated earlier, Saudi Arabia is an immense country covering more than 2 million square kilometers of land, and inhabited by 16 million people with access to the Internet, and for these reasons, Al-Sharhan in [21] proposed

the use of satellite technology in its system of education. By the dawn of the 21st century, the usage of Interactive Television Technology (ITT) through a fiber optic technology began to occur among Saudi universities. ITT allows faraway area students seeking education to engage in visual and auditory communication.

A study on the Internet usage was funded by King Abdul Aziz City of Science and Technology (KACST) in 2001, particularly on Implications of the Internet technology in the context of education. Meanwhile, the service of asymmetric digital subscriber line or ADSL has been introduced by Saudi Telecom Company (STC) and this has considerably decreased the cost associated with the Internet service. With the use of ADSL, more web-based instructions (WBI) could be implemented by universities. As reported in Albalawi [20], in 2002, there were 11 universities, 48 women's colleges, roughly 30 colleges, in addition to approximately 24.000 schools, operating in Saudi Arabia.

Figure 2 shows the number and percentage of the population of internet users in Saudi Arabia (2001–2011).

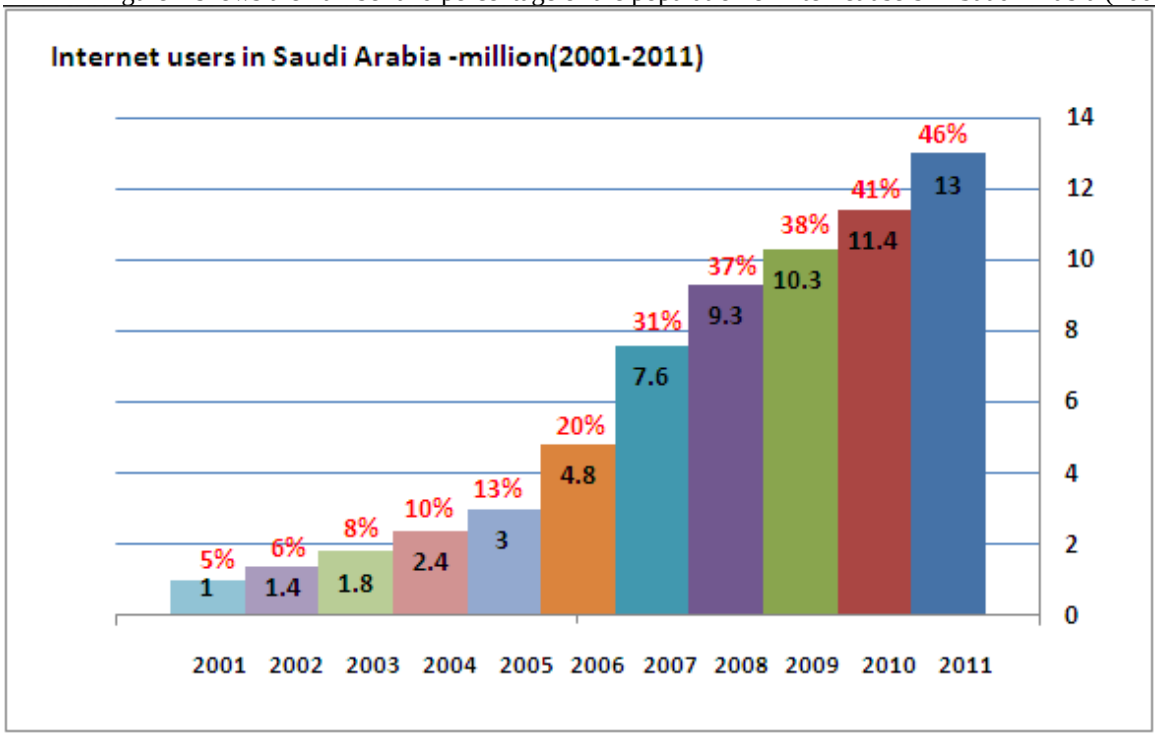

Figure 2: The number and percentage of the population of internet users in Saudi Arabia (2001–2011)

9. Emergence of E-Learning

Under the deanery of academic development, King Fahad University of Petroleum and Minerals and Aum Alqura University cooperated in the establishment of e-learning center in 2003, with the primary purpose of providing assistance to the academic university population in developing the education process utilizing the technology. Notably in the context of Saudi Arabia, e-learning is barely established in [22]. Notwithstanding, the Deanship of e-Learning and Distance Education was introduced in 2004 by King Abdulaziz University. Additionally, the Deanship of e-Learning and Distance Education was launched by King Saud University [20].

Notably, the year 2006 witnessed a considerable progression of E-learning in KSA, while the year 2007 was marked by the launch of National Center for E-learning and Distance Learning. Further, in cooperation with the Ministry of Higher Education and the Ministry of Education, educational programs have been broadcasted by Saudi television channels. Educational programs have also been broadcasted through radio channels which have assisted those remotely located students who utilize the conventional learning system.

E-learning in Saudi Arabia was still considered to be developing by 2008 [23]. During this time, information on its usage was still lacking. Following this, a national plan was devised by the government for the information technology adoption throughout the nation, and the plan was associated with e-learning and distance learning, with their possible utilizations in the context of higher education. Relevantly, the Ministry of Higher Education and National Center for E-learning and Distance Learning organized the first international conference e-learning and distance learning in 2009.

The Unit of Distance Education was also launched by University of Tabuk, and year 2010 witnessed the official endorsement and launch of distance education among a list of higher education institutions in KSA. In the following year, King Abdullah Ibn Abdul-Aziz Al Saud as the Premier and Chairman of Higher Education Council authorized the decision of the Council to launch Saudi Electronic University. The first batch of distance education graduate students of King Abdulaziz University was from the 2011-2012 school year.

Figure 3 provides a summary of the history of educational technology evolution when the attention shifted from technology-assisted learning to e-learning, then to web-based learning, and later to m-learning before, more recently, shifting again to the smart learning environment [24].

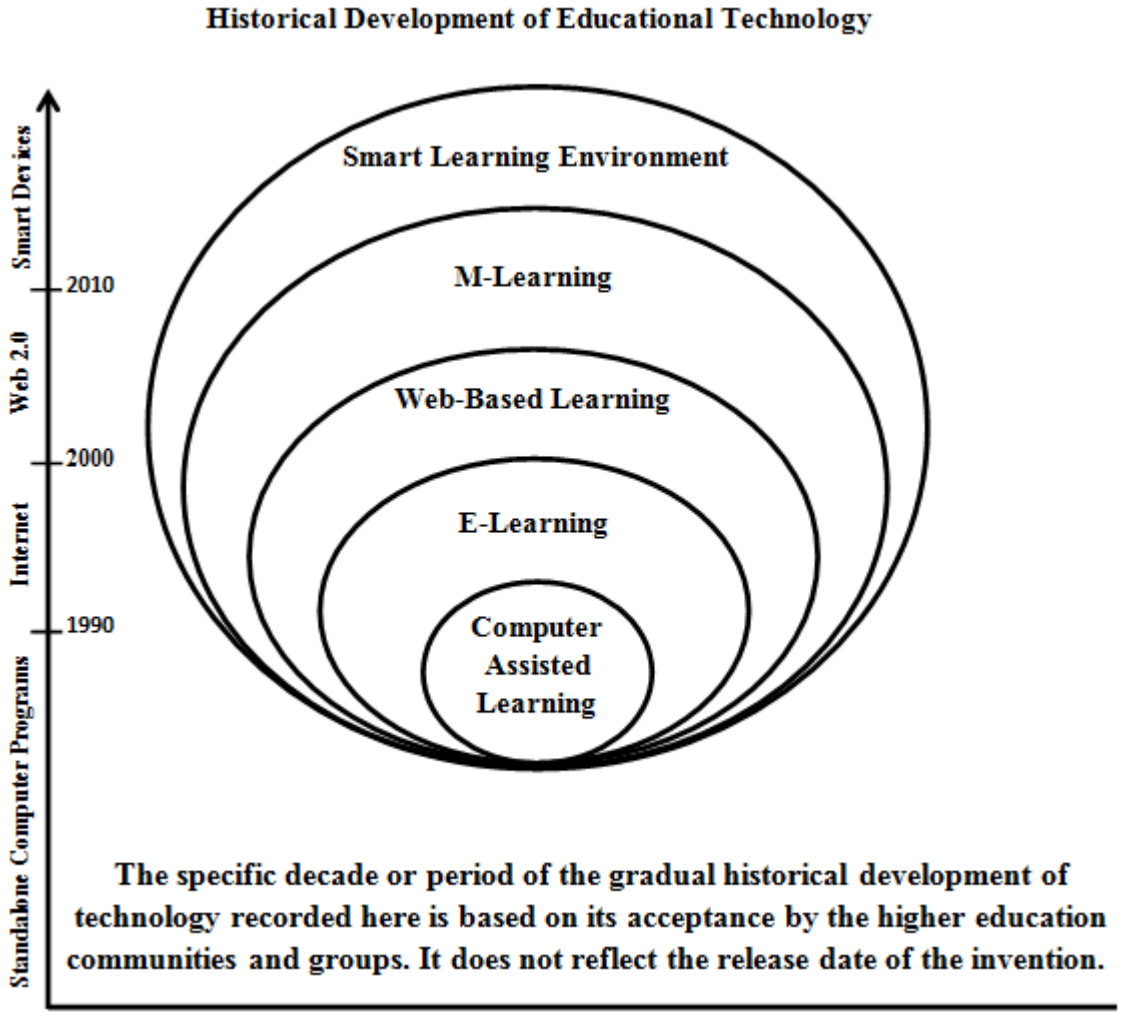

Figure 3: The gradual evolution of educational technology during the last three decades, developed by the authors [24].

10. Factors hindering full implementation of Educational Technology

In the context of education, it is important that technology is not treated as a substitute for the face-to-face instructions. Instead, technology should be treated as a way to achieve the sought-after results. Vikashkumar in [25] stated that educational technology (ET) utilization would create better learning conditions, while students are a vital element in the processes of teaching and learning. The use of ET extends the access to learning, stimulates equality, enhances the internal efficiency of the educational systems, generates education of superior quality, and prepares the people, young and old, for a technology-driven market place. Still, in reaching a comprehensive implementation of educational technology, Saudi Arabia remains plagued by countless of hurdles. Notably, as a G-20 nation, money

has not been considered an issue, because the government spends nearly one third of its yearly budget for education. As for these hurdles, they have close link to infrastructure, policies and teachers [25].

11. Infrastructure of Educational Technology in KSA

The government of Saudi prioritizes education and generally would allot roughly one third of the country's yearly budget for education. Such fraction of allocation is considered massive, and yet, the utilization of ET in schools in this country is far from satisfactory. The insufficiency of language labs, classroom computers, or other methods for the incorporation of computers into teaching has been reported in [26]. In fact, in the context of developing countries, Vikashkumar in [25] reported the existence of digital divide.

In order to achieve superior social, economic and education prospects, developing countries are obliged to consistently make the efforts to improve their current conditions. Equally, in the context of Saudi schools, the available policies impart great impact as well. This study therefore attempts to gain complete understanding of the issues at hand.

12. Lack of Appropriate Policies

Any forthcoming developments are impacted by governmental policies as policies are generally established to legitimize initiatives and insights. Furthermore, ET implementation in schools needs to be governed by policies that adhere to the Saudi context in order to be successful. In a relevant study, Almutairi et al. in [27] found that students have not been stimulated to engage in product contemplation, design, or assessment.

13. Early Stages of Internet Usage

Saudi Arabia did not see the presence of internet until 1994 following the use of Internet among the academic, medical, and research institutions. Three years after, the Internet was officially available in the country, and by 1999, the public started having access to the Internet. Internet access was initially under the governance of King Abdulaziz City for Science and Technology (KACST) as well as the Internet Service Unit (ISU), which is a department of KACST. In particular, ISU plays the role of internet change point with the purpose of increasing the awareness of public towards the internet. The rules and regulations were devised by ISU for providing governance to the Internet usage in KSA. The domain name system of the country was also managed by ISU. Several KACST-licensed commercial Internet Service Providers (ISPs) provided the internet to the public. KACST reported that by mid-2001, there were already 275,000 internet subscribers in KSA [10, 11].

14. Steady Growth in the Number of Internet Users

The utilization of the Internet in KSA is expected to continuously increase in a rapid manner. The innovative internet structure established in this country makes the Internet access less costly. In addition, 60% of the Saudi population is made up of young adults and teenagers with the ability to adapt to new technologies extraordinarily fast. Furthermore, e-learning is now being adopted in a number of Saudi universities and colleges. Equally, the e-learning market in KSA is expected to grow, and owing to this, the Arabic content on the internet is also expected to increase, which consequently will increase the number of Saud Internet user. Additionally, considering the increase of online services offered by more banks and companies, there will be more customers utilizing such services [28].

15. Saudis' Attitudes towards Educational Technology

The information and mass communication domain is fast undergoing transformation. Hence, the present paper is looking at the prospect of this innovative technology in English language teaching and learning, as foreign language in the context of Saudi Arabia. Additionally, several ideas concerning distance education are highlighted. Mokali in [28] accordingly reported two major directives of distance education as follows: the individual flexible teaching model and extended classroom model. Notably, learning, both individualized and collaborative, is eased by the interactive multimedia technologies. This has led to the birth of an innovative learning environment such as "virtual communities" whereby instructor and students can communicate using several, as needed, methods including face-to-face or emails. Information can also be shared between both parties with the use of computer networks.

Among B.A and M.D students of King Saud University, Al-Fahad in [29] examined the effectiveness of mobile learning, and the author found that mobile learning could potentially enhance students' retentive capacity through the improvement of both learning and teaching. Mobile learning can be employed at all times and places and this is regarded as its most significant positive feature. This learning method can enhance students' communication and enrich their learning experience in their open and distance learning.

Within the Arab domain, both e-learning and Distance education appear to be promising. Hence, the government has officially announced the distance learning application. In order to achieve the objective, six infrastructures were introduced for both higher education and distance education. Also, an e-learning management system was introduced by the ministry of higher education to cater the needs of university education in the country by establishing the academic and administrative skills and management system, generating the electronic content of curriculum and forms and educational portal for both e-learning and distance learning, just to name a few.

The innovative technology has indeed opened up vast prospects for achieving superior education, especially in the context of Saudi Arabia. Notably, the utilization of these technologies is still far from adequate. For this reason, Al-Fahad in [29] reported the inability of the Saudis in gaining the greatest benefit at all operation levels. Nonetheless, the current usage of technologies appears to be promising that brighter future may be achieved.

16. Rapid Growth and Expansion

Saudi Arabia pursues the fast growth of higher education. University capacity increased to 1.7 million students, up from 850,000 in 2009 and 636,000 in 2006 [30]. Graduate programs extended and diversified to reach a target of ensuring 5% of the student population are graduates. The recent development concentrate on the improving the scientific workforce and providing the graduates with the essential knowledge and education to implement it to entrepreneurship, an area where significant progress remains to be made for the translation of knowledge into production.

Figure 4 shows the numbers of Saudi universities in 1989, 1999 and 2012, while Figure 5 and 6 illustrate the numbers of academic departments and colleges respectively [30].

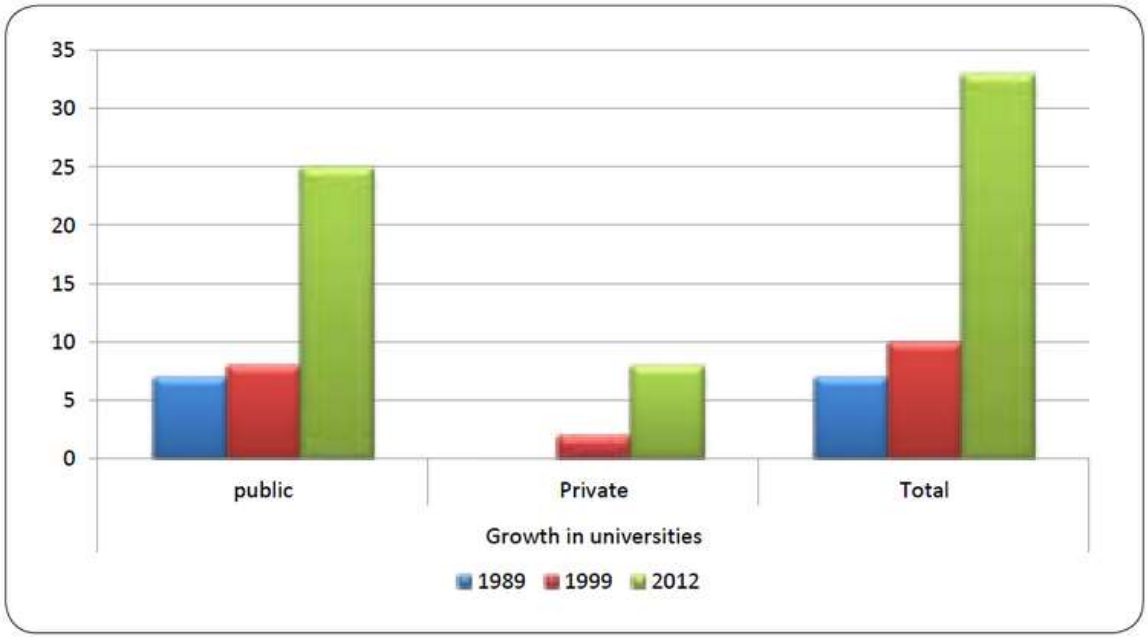

Figure 4: Growth in the numbers of universities [30].

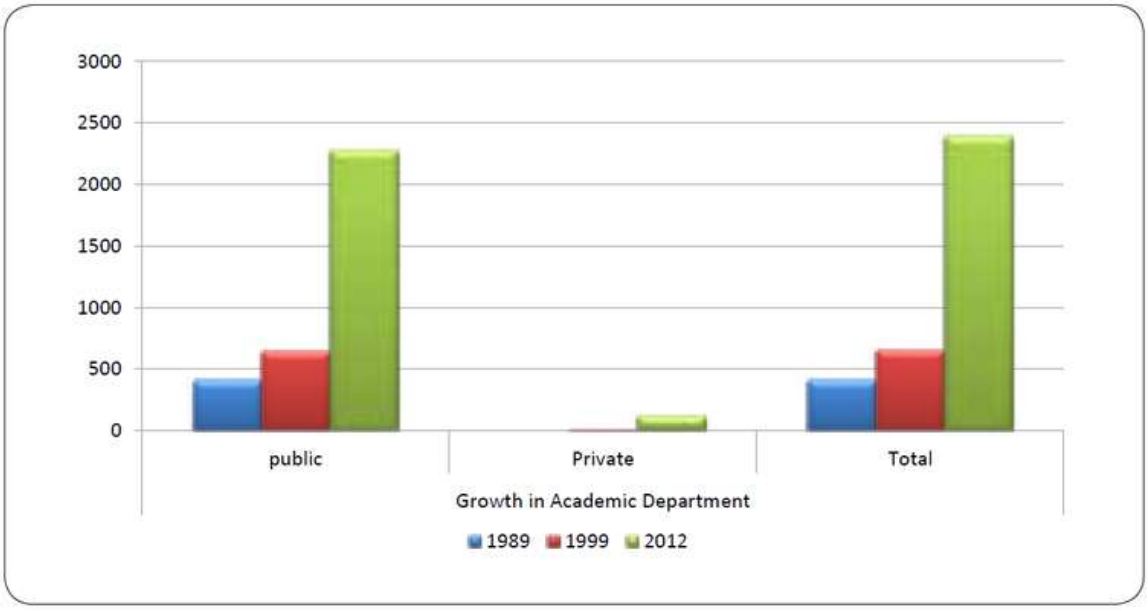

Figure 5: Growth in the numbers of academic departments [30].

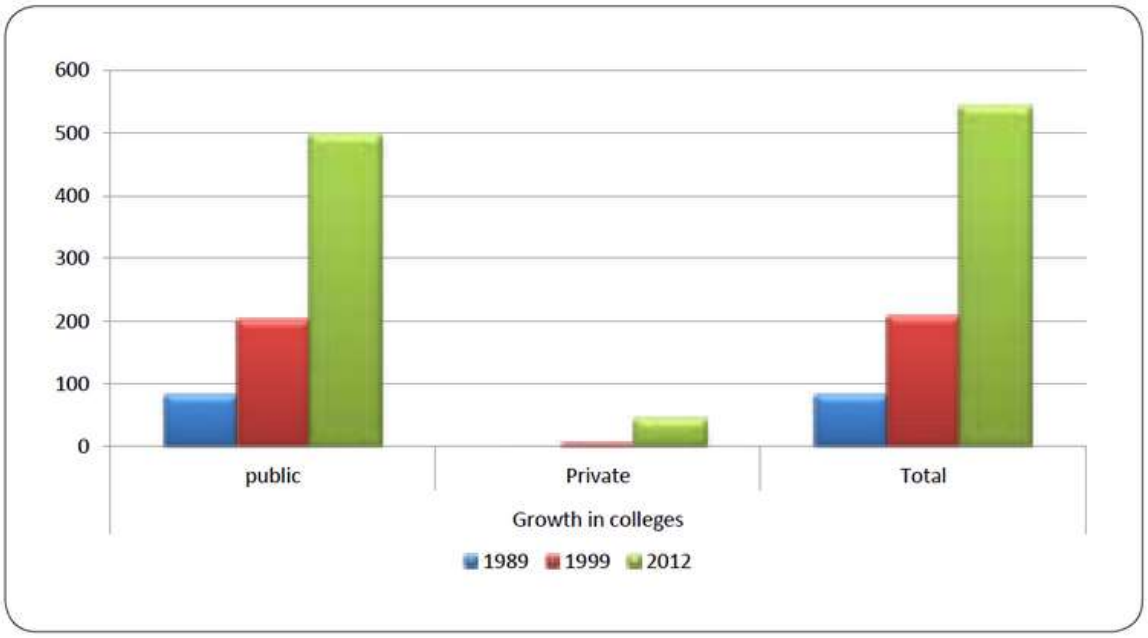

Figure 6: Growth in the numbers of colleges [30].

Figure 7 shows the number of accepted students based on gender over the period 1999–2012 [30]. Growth in the number of faculty members [30] is illustrated in Figure 8.

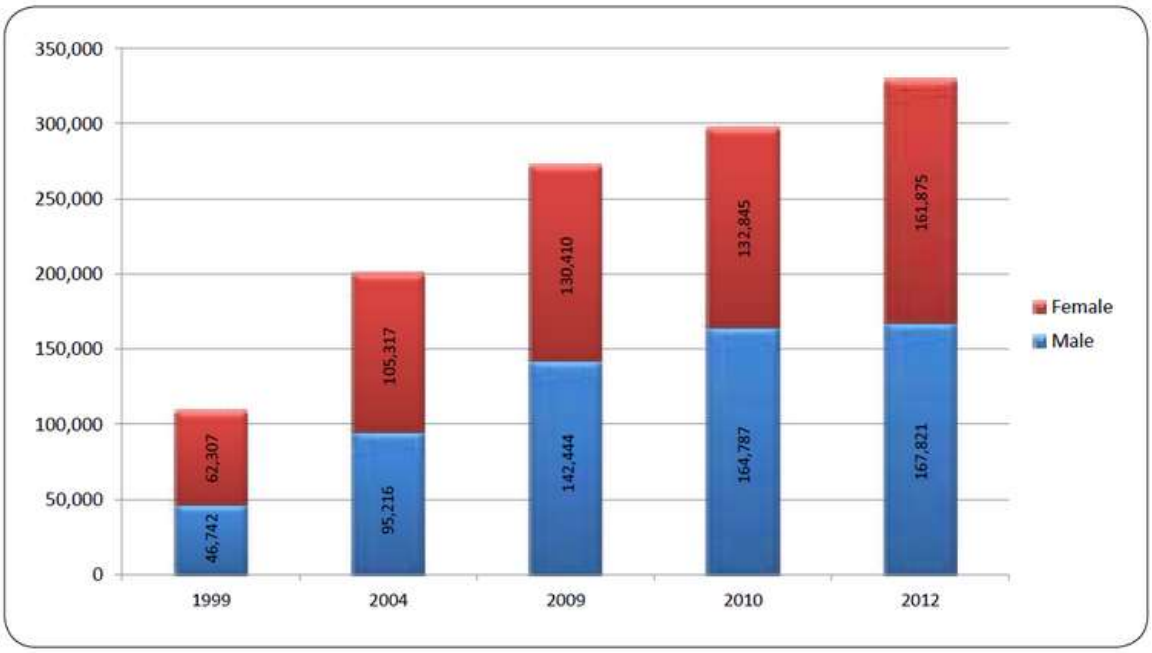

Figure 7: Growth in the numbers of accepted students [30].

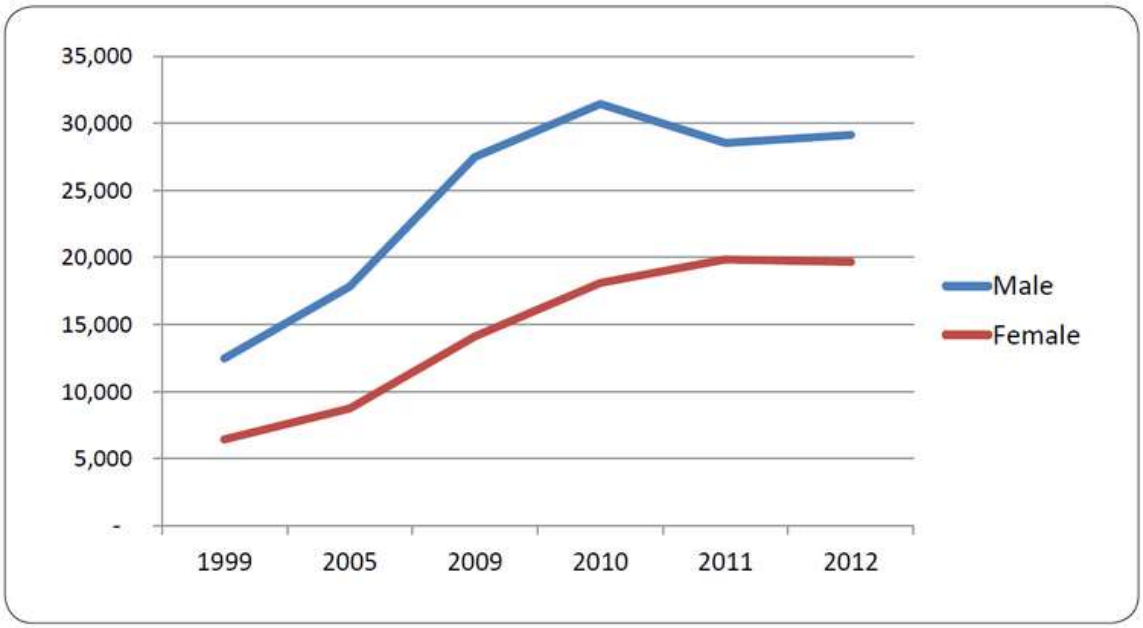

Figure 8: Growth in the number of faculty members [30].

17. Educational Technology Contribute The Universities International Rankings

The use of educational technology is one of the factors that affected and improved the educational process which in turn contributed to increase the international ranking of Saudi universities. Recently; a university rankings indicate that Saudi Arabian universities moving up the global charts [30]. In 2003 there were no Saudi universities in the world academic ranking, while in 2016 three Saudi Arabia universities in the global top 500 universities, while 4 other Saudi universities are moving up to reach the top, as illustrated in figure 9.

GLOBAL RANK	UNIVERSITY
189	King Fahd University of Petroleum & Minerals (KFUPM)
227	King Saud University (KSU)
283	King Abdulaziz University (KAU)
501–550	King Khalid University(KKU)
501–550	Umm Al-Qura University (UQU)
651–700	Al-Imam Muhammed Ibn Saud Islamic University
701+	King Faisal University

Table 9: QS Rankings for KSA universities (2016) [30].

In 2003 there were no Saudi universities in the Shanghai Rankings but Saudi Arabia in 2016 has 4 universities in the global top 400 [30], as illustrated in figure 10.

GLOBAL RANK	UNIVERSITY
101–150	King Abdulaziz University (KAU)
101–150	King Saud University (KSU)
201–300	King Abdullah University for Science and Technology (KAUST)
301–400	King Fahd University of Petroleum & Minerals (KFUPM)

Table 10: Shanghai Rankings for KSA universities (2016) [30].

Finally, in the 2016– 2017 Saudi Arabia has two universities in the global top 500 based on Times Higher Education World University Rankings, while 2 universities are moving up to reach the top [30], as illustrated in Table 11.

GLOBAL RANK	UNIVERSITY
201-250	King Abdulaziz University (KAU)
401-500	King Fahd University of Petroleum & Minerals
501-600	King Saud University
601-800	Al-Faisal University

Table 11: Times Higher Education Rankings for KSA universities (2016–2017) [30].

Figure 12 shows the top universities in Saudi Arabia according to International Rankings.

Universities	Times Higher Education Ranking (2020)	Shanghai Jiao Tong University Ranking (2020)	TopUniversities Ranking (2020)	U.S. News & World Report Ranking (2019)
King Abdulaziz University	201	-	186	76
Alfaisal University	251	-	-	-
King Fahd University of Petroleum & Minerals	501	-	200	597
King Saud University	501	-	281	356
KAUST: King Abdullah University of Science and Technology	-	-	-	168

Figure 12: Top universities in Saudi Arabia according to International Rankings [31].

18. Conclusion

Educational technology is the use of both software, physical hardware, and educational theoretic to facilitate learning and improving performance by using, creating, and managing appropriate resources and technological processes. This study discussed the new phenomenon of e-learning that is emerging in Saudi Arabia, the fundamental phases, and switches towards e-education in general. The educational technology employment since the mid-1900s was highlighted, specifically on the initial phase, the progressions, and the present status. The dramatic increase in technology application in schools, institutes and universities was described as well. Also, the study examines the attitudes of Saudis towards this worldwide phenomenon. Past works on e-leaning/e-education in the Saudi Arabian context were reviewed as well as rapid expansion of higher education.

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