A Qualitative Analysis on the Benefits and Limitations of Learning Management Systems (LMS) in Saudi High School Education

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ABSTRACT The past decade has been characterized by a strong global trend towards the adoption of Learning Management Systems (LMS) in the educational environment. Saudi Arabia has recently invested in the digitization of education. Taking the Technology Acceptance Model (TAM) as a starting point, this study sought to understand the knowledge and early experiences of Saudi high school teachers with a particular LMS, called Future Gate. Qualitative in-depth interviews with 20 Saudi high school teachers were thematically analyzed. Findings suggest that high school teachers are well-informed about Future Gate and its purpose and have mostly positive perceptions of this LMS. Yet, some limitations exist, including unfamiliarity, lack of infrastructure, technical issues, and quality-related concerns. The findings are valuable because they can inform both educational leaders and software developers on how to improve and facilitate the use of LMS.

INTRODUCTION

The introduction of the internet and the World Wide Web have had major impacts on all aspects of society, including educational systems. eLearning, defined as "any educational intervention that is mediated electronically via the Internet" (Vaona et al. 2018: 5) has become a popular mode of education worldwide (Zhou et al. 2020). To effectively deliver eLearning, educators often use Learning Management Systems (LMS). These are web-based software applications that are designed to handle learning content, student interaction, assessment tools, and reports of learning progress and student activities (Nasser et al. 2011). These systems are praised for their easy usage, open and flexible access to material, time and cost-saving aspects, interactive and collaborative nature, and efficient management (Snoussi 2019).

In a western context, the implementation of LMS in education has been fairly well-established and already became a mainstream form of learning in the early 1990s (Kentnor 2015; Bari et al. 2018). This is in strong contrast to the situation in the Middle East, where eLearning and LMS are still in their developing phases (Toumi 2017; Snoussi 2019). Saudi Arabia, a country located in Western Asia and constituting the bulk of the Arabian Peninsula, makes an interesting

case in particular as its views and approach with regards to modern technology have changed dramatically in only a short space of time. Public access to the internet started in 1999 (Profanter 2014) in Saudi Arabia. The internet penetration in the country has increased from 27 percent in 2009 (Miniwatts 2010) to 93 percent in early 2020 (Kemp 2020). Today, a completely different approach is taken with the government investing heavily in LMS development and eLearning and even aspiring to become a leading nation in this environment (Alnahdi 2019).

One of the country's most innovative projects is an initiative introduced in 2016 and called "Future Gate." The aim of this LMS was to digitize learning for all Saudi 7-12 schools by 2020 (Toumi 2017). Future Gate was implemented in three steps. First, it was implemented in 150 schools in three regional education departments during the 2017-2018 school year. Later on, in the same school year, 160 more schools were added. The program expanded to 1,583 schools in 2019, and since recently Future Gate has been implemented in all K-12 schools.

Although there exists a rich literature on the experiences of Saudi teaching staff with LMS (Ilyas 2018; Tawalbeh 2018; Trisiana 2020), only a handful of studies have focused on the experiences of K-12 Saudi high school teachers (Alahmari and Kyei-Blankson 2016; Bingimlas

2017) and very few scholars have focused on Future Gate in particular (Al Ohali et al. 2018; Masmali 2020). The few studies that have focused on Future Gate were conducted during the platform's trial phases, and to the researchers' knowledge, the current study is the first one since Future Gate's full, nationwide implementation. More so, the current COVID-19 pandemic has demanded school staff to adapt to LMS at a much faster pace than anticipated. Taking into account that specialists predict an increasing prevalence of infectious disease outbreaks in the future (Pan et al. 2020), gathering fresh insights on how Saudi K-12 teachers currently experience working with a governmental initiative such as Future Gate is paramount. The results of this study will inform software developers on how to review the LMS and address potential pitfalls in a timely fashion, so that K-12 teachers can fully benefit from Future Gate in the future – especially in the event of a new health crisis.

Theoretical Framework

The results of this study were analyzed in the context of the Technology Acceptance Model (TAM) developed by Davis (1986). This model has been widely used to investigate teachers' acceptance of eLearning (Alahmari and Kyei-Blankson 2016; Wingo et al. 2017; Scherer et al. 2019). TAM has been modified several times; this study follows the model's final version as developed by Venkatesh and Davis (1996).

In TAM, perceived usefulness and perceived ease of use are hypothesized and empirically supported as fundamental determinants of user acceptance of a given technology such as an LMS. In other words, the successful implementation of educational technology depends largely on teachers' attitudes towards technology. Teachers indeed play a crucial role in supporting or discouraging technology integration, and following this train of thought, it is expected that the optimal use of Future Gate in Saudi K-12 education will be determined by teachers' perceptions of this technology. This means that if teachers perceive Future Gate as a positive and useful technology that is easy to use, there is a high likelihood for this technology being successfully adopted in K-12 schools across Saudi Arabia.

Advantages

The most cited advantages of LMS include its convenient use and monitoring, access from various locations, and communication and transparency benefits. An important benefit to LMS is that they allow for easy access to information (Snoussi 2019). With LMS being available, both students and teaching staff are no longer required to print material and buy textbooks (Iqbal 2011), making life easier, and more time-efficient and cost-effective (Snoussi 2019).

A second considerable advantage is that an LMS like Future Gate allows teachers to easily monitor student behavior and keep track of assignments and planned lessons (Iqbal 2011; Snoussi 2019). In alignment with this, LMS are excellent communication systems as they do not require in-person attendance. They also provide more transparency towards the parent; indeed, research has suggested that parents can significantly benefit from LMS as it gives them the opportunity to keep track of their child's educational process (Laho 2019). In addition, through the system, they can access school assignments, information, and resources, which can help them to remain up-to-date about their child's academic life (Laho 2019).

Yet another advantage is the accessibility of the platform from various locations (Iqbal 2011). As long as the information is uploaded on the platform and there is an Internet connection available, parties can access resources from anywhere in the world. Masmali (2020) added that computers and the internet are essential educational technology resources as they offer access to database searches so that students can find resources from around the world (Masmali 2020).

Limitations

Some of the limitations associated with LMS include the need for devices and a strong Internet connection, technical issues, societal acceptance, and lack of familiarity with technology. The availability of technology devices and a strong Internet connection are, without a doubt, the most important conditions to make the adoption of LMS successful (Masmali 2020). Although Internet infrastructure has gradually improved over the years, it seems that Internet speed in villages is still unsatisfactory and has

not yet reached the level of Internet speed present in the cities (Walabe 2020). With specific reference to Future Gate, Al Ohali et al. (2018) stated that for the first period of the project all participating schools were connected to 10Gbps internet and were equipped with wireless access points throughout the school building. Although the plan was to provide a similar infrastructure for all other schools that would adopt the technology in a later stage, Masmali (2020) indicated that these plans have unfortunately not been realized and proper internet connectivity and speed remain important issues. These findings call for the attention of service providers to take action to improve internet speed and assure easy and fast access throughout the whole day.

The availability of proper devices is an additional must; without equipment, the value of LMS indeed becomes redundant (Alshammari 2019). Unfortunately, a recent study conducted by Alshammari (2019) found that many higher education institutions still lack proper access to technology. In the specific context of Future Gate, Masmali (2020) noted that during the 3-phased implementation of the LMS, only schools chosen in the first phase were provided with educational technology equipment including laptops, SMART board, projectors, and reliable internet to help digitize learning. Those schools that only adopted the technology in a later phase could not enjoy the same benefits, and as a result, many of those schools still lack technology and internet access, especially schools located in rental buildings and schools in the rural areas (Masmali 2020).

Another common issue with modern technologies and more specifically, LMS relates to technical problems. One major issue that many Saudi students still deal with today is the poor user design of eLearning apps. Regardless of technological advancement, many eLearning apps and platforms are still scourged with bugs, and traffic overload errors still occur too frequently (Hustad and Arntzen 2013; Khalil et al. 2020). Technical and user problems are significant barriers because the acceptance and use of any software application system depend to a great extent on the quality of its user interface (Alshammari 2019). Technical problems – especially when they are not solved immediately – can be interpreted as time-wasting and discourage usage (Hustad and Arntzen 2013).

Even if devices are provided, a strong Internet connection is present, and there are no technical issues, societal resistance can still prevent individuals from using a newly introduced LMS. In Saudi Arabia, especially the older generation remains sceptical and has expressed much concern about Internet safety (Alenezi 2012; Altameem 2013; Alshammari 2019). This has posed a serious obstacle to the successful use of an LMS like Future Gate (Laho 2019; Masmali 2020). In addition, Alshammari (2019) found that many Saudi educational institutions are still resistant towards the idea of using LMS because educators believe that they do not offer the same level of quality education and social interaction between the students and the learning ecosystem as traditional face-to-face education. When teaching staff shows a disinterest, this can be a drawback for students and parents to engage with the LSM, further obstructing the successful implementation of the LMS (Laho 2019).

A lack of familiarity with technology can pose an additional threat to the smooth adoption of an LMS. Zheng et al. (2018) have noted in this regard that when technical support is available, teaching staff can become familiar and trusted with technology at a fast pace, which can increase positive perceptions and a stronger willingness to adopt the concerning technology (Zheng et al. 2018). Unawareness of the potential benefits of an LMS can often explain negative perceptions, and if those benefits are emphasized through training and other support, these negative perceptions are more likely to transform into positive ones (Zheng et al. 2018; Khalil et al. 2020).

Objectives

The objective of this study was to investigate and better understand the knowledge and early experiences of Saudi high school teachers with Future Gate, an LMS that has been recently implemented by the Saudi government in all K 7-12 schools on a national level.

MATERIAL AND METHODS

Research Design and Participants

The study deployed a generic qualitative design with a constructivist approach. Constructivists are concerned with understanding the

subject's experience with a specific topic from his/her point of view; thus, they acknowledge that individuals experience the same phenomenon in different ways (Symon and Cassell 2012). As the current study focused on understanding how high school teachers experienced the implementation of the Future Gate program in their school, a constructivist approach seemed the appropriate choice.

The participants were 20 high school teachers who had experience with Future Gate. The participants were relatively young, with the majority of them being below the age of 35 years. Only five participants were 40 years or older. Thirteen participants were male, and seven were female. Table 1 provides details on the age and gender of the participants.

Data Collection and Instrument

Data were gathered during February and March 2020 through a semi-structured interview protocol. A first set of questions asked about general knowledge of Future Gate, that is, what is it, and why has the government invested in it? The second set of questions assessed participants' perceived need for an LMS such as Future Gate, and a third group of questions were developed to understand participants' experiences – both positive and negative – with Future Gate.

Participants were recruited using a combination of voluntary sampling and snowball sampling. The study was advertised, and participants self-selected to participate. Interviews were conducted face-to-face at a mutually agreed location that was convenient for both the participants and the researchers. Informed consent from the participants was obtained, and interviews were audio-recorded.

The interviews were conducted in Arabic by a bilingual researcher and lasted for approximately 50 minutes each. The interviews were translated into English; however, efforts were made to keep the idiomatic nature of the Arabic (Santos et al. 2015). Where a quote is provided below, the English has sometimes been adjusted to make the meaning clearer to native English readers.

After each interview, the researchers wrote down key ideas and possible themes, and after 20 interviews, the researchers decided that fur-

ther interviews would not yield additional insights as theoretical saturation had been reached (Strauss and Corbin 1998).

Data Analysis Procedures

Data were analyzed using a thematic analysis approach. Recorded interviews were transcribed, translated into English, and uploaded in Nvivo12 after which the analysis process commenced. The researchers followed the specific six-step analysis procedures as outlined by Terry et al. (2017). The six steps are: familiarization with the data, generating coding, constructing themes, reviewing potential themes, defining and naming themes, and producing the report.

Practically, the researchers first read and re-read the transcripts to get familiar with the data. Next, codes were assigned to text fragments that represented a particular idea. This process continued to a point where no new codes or concepts could be identified. Similar codes were then gathered under subthemes and themes. In a fourth step, these subthemes and themes were reviewed to make sure they made sense and were aligned with the research objectives. Subthemes and themes were then named, and a report was produced, which follows in the next section.

RESULTS

Three overarching themes were identified: understanding of Future Gate, positive perceptions and experiences with Future Gate, and potential pitfalls of Future Gate. To protect the participants' identity, they were assigned a participant number. Whenever a direct participant quote is provided, the participant number will be provided in brackets to signify who the quote was from (see Table 1 for particpants details). It is important to note that quotes were translated from Arabic to English and have been slightly amended so that they would make sense when read by an English-speaking person (Santos et al. 2015).

Understanding of Future Gate

The introduction of Future Gate into Saudi high schools was overall positively received by all participants. Future Gate was a well-known initiative and participants had an excellent grasp of its history and aims.

Table 1: List of participants

Inter-viewee	Age	Gender	Inter-viewee	Age	Gender
1	28	M	11	30	M
2	40	M	12	29	F
3	29	F	13	50	M
4	45	F	14	48	F
5	36	M	15	34	M
6	32	M	16	32	M
7	26	M	17	40	M
8	33	F	18	32	M
9	31	F	19	29	F
10	36	M	20	39	M

The Ministry of Education launched the Future Gate Program to support the transition to digital education. The first phase began in 2017-2018 with 310 schools in 7 regions. The second stage in 2018-2019 included 1893 schools in 16 regions, and in the third and final stage in 2019-2020, Future Gate was implemented in all schools in the Kingdom of Saudi Arabia. [3]

In relation to what Future Gate precisely entailed, a participant noted:

[Future Gate is] an interactive electronic portal between teachers, students and parents under the supervision of the school administration and education administration which offers education services and supports distance education through curriculum management and class management tools such as virtual classes, electronic duties, and electronic tests. [2]

Another participant added:

Future Gate provides interactive content for students and enables the teacher to upload homework and worksheets, in addition to electronic tests, question bank, quarterly plan, and communication service with students and parents. Future Gate also offers an electronic preparation service through which the teacher can submit his preparation, and teachers, students and school administration can view the weekly and daily program and schedule virtual classes for students. Future Gate also supports students' competitive points system to measure interaction and benefit from the portal. [11]

Positive Perceptions and Experiences with Future Gate

Participants mostly described positive perceptions and experiences with the Future Gate platform. The platform was viewed as an attempt from Saudi Arabia to improve the educational sector and has positive features included the expansion of the learning experience outside the classroom, the facilitation of communication and transparency, and the management benefits that the platform offers to teachers, students, and parents.

Future Gate as an Attempt to Improve the Educational Sector

Participants emphasized that Future Gate was implemented by the Saudi government in an attempt to improve the Saudi educational sector; thus, Future Gate symbolized academic progress and improvement.

The future gate indicates its name as it is: a departure from the stereotypes and traditionality used in education previously and is a digital transformation to create educational content suitable for the current generation based on interaction, simplicity and ease. [10]

The term *improvement* was used rather frequently and clearly suggested that the adoption of technology in the learning environment was considered a net gain:

[The aim is to] increase educational awareness in general while striving to highlight the best educational practices and work to improve the educational sector in the Kingdom of Saudi Arabia. [9]

Participants agreed that the implementation of Future Gate in high schools was necessary as technology is important to youth and adopting such into the educational field creates an attractive environment for young students. As a result, students may be more inclined to apply themselves to their studies.

It creates an attractive and new environment that relies on technology in the delivery of knowledge. [18]

In addition, the results suggested that students can acquire important research skills through the adoption of technology, as well as learn how to be self-sufficient and independent.

It creates an appropriate climate for the student to help him study well and work to build his ideas and development from it and make him resort to self-reliance and research in all the different sciences and discover the many secrets of science. [12]

The acquisition of such skills was especially deemed important as it was believed that the adoption of e-learning in K-12 could contribute

to the successful flow of students from high school to university. Participants stated that most universities use digital learning tools and that it could be beneficial for high school students to already become familiar with digital learning before entering university. Conversely, students who have not been exposed to e-learning during high school studies may struggle more in university.

It helps them to develop different skills because instead of the student receiving information through the teacher, they are now pushed to search for information themselves and this opens new horizons for them and makes them look to the future as well as makes them more ready for university studies and the labor market. [10]

Interestingly, it was also noted that Future Gate contributes to the professional and personal development of teachers, and so not only students' benefit from the system.

[It aims] to develop teachers' scientific and educational capabilities. [5]

Expanding the Learning Environment

Participants noted that the adoption of e-learning could be especially useful as it allows for the expansion of learning activities outside the classroom. Traditionally, students' learning experience was limited to the classroom environment; with Future Gate, this was no longer the case as the platform allows students to engage in learning activities from their own homes.

It encourages the expansion and dissemination of educational processes outside the boundaries of the school, instead of being restricted to the classroom and the school environment. [11]

Another participant added that Future Gate stimulates students to deal with problems and issues outside the class environment.

It allows for extending the activity and scope of educational processes where it is not limited to schools only. (…) One of the goals of education is to teach the student how to deal with the outside world and solve problems outside the school environment. Working with the platform ensures that knowledge is not confined within the school and the classroom or the school environment. [13]

Facilitating Communication and Transparency

A key benefit to Future Gate related to ease of communication and transparency. Participants reported that Future Gate allows students, teachers, parents and other staff to communicate with each other in a direct and efficient way. Traditional communication requires each of these parties to be physically present at a certain time and these requirements are no longer needed in the context of Future Gate.

It helps to realize direct communication between the pillars of the educational process (teacher, student, supervisor, school leader and parent) and to create an enjoyable learning environment for positive interaction between students and teachers. [1]

It is an effective communication channel for all employees of the Ministry of Education and teachers in the educational sector. [8]

Participants especially emphasized the improved communication and transparency between parents and teachers.

It also supports communication with parents because they can view the educational status of their children, follow up on behavioral notes if any, and engage in direct communication with teachers, and this all through the portal. [15]

the future portal helps the student's guardian to follow his child's behavior and his academic achievement directly; without the need to visit the school. [7]

Results suggested that the ease of communication and transparency are especially important in emergency situations that do not allow for face-to-face meetings, such as the current Covid-19 pandemic.

It is a key means of communication in the event of crises and emergency situations such as (Corona Virus Crisis - War Crisis in the Southern Kingdom). [19]

Managerial Benefits for Teachers

A fourth perceived benefit referred to the facilitated management of different activities through the platform. Certain student behavior such as absence and attendance, but also participation in activities and weekly scheduled can be monitored through Future Gate.

Future Gate provided me with a set of educational services, a learning management system through which interactive content is provided to students and through which the teacher can upload and review homework and worksheets. In addition, there are electronic tests, a question bank, a quarterly plan, and communication services for students and parents. The Future Gate also provided me with an online preparation service through which the teacher can provide his preparation, and teachers, students, and school administration can view the weekly and daily program and schedule virtual classes for students. [20]

It provides the ability to monitor behavior, absence and attendance of students, and the ability to schedule courses electronically effortlessly. [12]

Potential Pitfalls of Future Gate

Although Future Gate was predominantly evaluated as a positive addition to the educational system in Saudi Arabia, participants mentioned some difficulties and limitations to the system. These included a general unfamiliarity with and disinterest in LMS, lack of proper infrastructure, technical issues, and quality-related concerns.

Unfamiliarity and Disinterest

Results suggested that the adoption of technology is a relatively new trend in Saudi Arabia. As such, there remains much resistance to the acceptance of Future Gate.

Teachers need to have an awareness and desire to deal with technical devices. Lack of conviction of using modern electronic media in teaching can be a barrier. [17]

There is a difficulty with completely eliminating traditional education, and directly replacing it with e-learning. [13]

Another problem is the low level of familiarity and fluency of teachers with e-learning.

There is a great shortage of teachers who are fluent in "the art of e-learning", and it is a mistake to think that all teachers in schools can contribute to this type of education. [14]

Participants stated that schools do assist in this regard and provide training and guidance; however, there was much disagreement with how effective and sufficient these training courses

are, as is illustrated by the following contrasting quotes:

The administration gives advice and contributes to adapting to the program. They provide training courses on the system, and the presence of a digital transformation official to guide teachers and students is useful; they respond to explanatory inquiries and address technical inquiries. [1]

Most of the school teachers did not receive online training, and for most of those who did receive it, their training was not enough. Teachers have four basic issues regarding the effectiveness of Internet use in the classroom. These are the availability of ways to use the internet, adequacy of use and time, effective and available training, and good management support. [11]

Lack of Proper Infrastructure

A second obstacle to Future Gate related to physical deficiencies such as the lack of available computers and internet connection. Participants explained that as these technologies are fairly new in Saudi Arabia, many schools do not have the proper infrastructure available, and this can cause problems in terms of access to the platform.

Schools are still crawling in the digital and technical world and stumbling a lot with their poor technical equipment and troubled internet networks. [15]

Some students don't have the internet sometimes. [13]

To solve these issues, participants of this study suggested that schools should arrange access to computers and the internet for its staff and students.

Schools should give each teacher a new computer, and there should be a computer section or lab that the students can use in their free time or offer to use them in some schools in the evening. [13]

Schools should provide the technical infrastructure to ensure the quality of the service and avoid connectivity interruptions. [2]

Technical Issues

A third identified issue was the relatively high prevalence of technical issues with the system such as incompatibility with certain devices or

lack of notification messages. Some participants opinionated that the system needs to be updated, as such issues make Future Gate difficult to deal with and less attractive. More specifically, some said that the Ministry of education should have done a quality-check first before launching the system on a national level.

The application is weak for phones, the app stops working out of the blue sometimes, and there is a large number of programmatic and technical errors. It is incompatible with many devices and the absence of notifications indicating an update or added file is not ideal, especially as it is known to programmers that notifications are the reason for the success of any application. The problems are not limited to the application; even the website is still not what was hoped for. (…) The Ministry should have tried these out first before generalizing it, and they should have solved the problems immediately when they appeared. [19]

The incidence of these problems was mainly accredited to the novelty of these technologies in Saudi Arabia and the lack of trained individuals who can address such issues in a time-efficient way.

[There is] a lack of maintenance centres that can solve technical problems, especially in remote areas. There are only a few people with experience and competence in the field of e-learning management and only a few providers of telecommunications infrastructure. [13]

The portal needs hardware, internet, and a fast browser, and it requires continuous follow-up in order to distinguish itself from other systems. [7]

Quality Assessment

A last issue related to the fear that the adoption of Future Gate could inhibit the quality of traditional learning systems. For instance, some were concerned about the app replacing text books or not focusing as much on reading and writing skills.

It is important that the system does not go to the dispense of the textbook as the textbook is one of the sources of learning. [6]

Reading and writing are basic skills that cannot be ignored in any way, regardless of the technique used, especially in the elementary grades. [20]

To conclude, another concern was the excessive exposure to the internet, which according to some would be a negative distraction for students.

Excessive interaction with technical devices may lead to students deviating from education. [4]

DISCUSSION

The past decade has been characterized by a strong global trend towards the adoption of Learning Management Systems (LMS) in the educational environment. The Saudi government have invested heavily in the digitization of education over the past few years (Alnahdi 2019). This study sought to investigate and better understand the knowledge and early experiences of Saudi high school teachers with Future Gate, an LMS that has been recently implemented by the Saudi government in all K 7-12 schools on a national level. The results of this study were analyzed in the context of the Technology Acceptance Model (TAM) developed by Davis (1986).

One significant finding of this study was that participants had an excellent understanding of Future Gate, and participants were far from opposed to this technology. Specifically, participants believed that the implementation of Future Gate symbolized academic progress and improvement. More specifically, the results suggested that working with an LMS like Future Gate was indirectly positively linked to academic success. The adoption of this technology would indeed create an attractive environment for young students and could result in more robust academic engagement. In addition, participants stated that through working with Future Gate students could acquire important research skills as well as learn how to be self-sufficient and independent. These skills would, in turn, help students prepare themselves better for university and thus were considered extremely valuable. These findings confirm results obtained by Masmali (2020) who found that computers and the internet are essential educational technology resources and are crucial in the development of research skills that are important to prepare a student for university.

Other specific advantages that were associated with Future Gate included learning flexibili-

ty, facilitated communication and transparency, and ease of management. One major benefit of Future Gate is that the platform allows learning from any location, provided that there is an Internet connection. The findings confirm those obtained by Iqbal (2011), who highlighted that easy accessibility is indeed a big advantage to LMS. The findings suggest that this type of flexibility encourages students to learn and stimulates their independency.

Furthermore, the findings suggest that an LMS such as Future Gate provides an easy communication channel for parents and improves transparency. Future Gate indeed allows all parties involved to communicate with each other in a more direct and efficient way, and allows parents to keep track of all school activities and their children's academic progress. These findings corresponded with work done by Laho (2019) who concluded that parents could significantly benefit from LMS as it gives them the opportunity to keep track of their child's educational process and helps them with remaining up-to-date about their child's academic life (Laho 2019).

There was some consensus between participants of this study that LMS facilitate the management of different activities, such as data on student attendance and class participation. These findings implied that LMS provide structure and allow for easy supervision in comparison to face-to-face education. These results confirmed findings obtained by Iqbal (2011) who has similarly suggested that LMS make it easier for both teachers and students to plan study activities, access material, and follow academic progress.

Overall, the results suggested that, unlike what Alshammari (2019), Laho (2019), and Masmali (2020) have claimed, Saudi high teachers are positive towards the idea of educational digitization, and are open to its implementation in high schools. However, these findings need to be nuanced as the results of this study suggested that some limitations to the adoption of LMS such as Future Gate remain present. These limitations included a general unfamiliarity with and disinterest in LMS, lack of proper infrastructure, technical issues, and quality-related concerns as the main issues.

Unfamiliarity and disinterest are probably the most prominent challenges to LMS adoption. Many participants in this study agreed that the adoption of technology is a relatively new trend in Saudi Arabia, and many remain unfamiliar with the concept. As a result, acceptance of technologies such as Future Gate is lower than desired. In alignment with these findings, Zheng et al. (2018) noted that negative perceptions of LMS are often the result of an unawareness of the potential benefits and proper use of such a technology, and, as long as the use and value of LMS remain unclear, negative perceptions will not change. These findings are somewhat concerning as Laho (2019) has warned that when teaching staff shows a disinterest, this can be a drawback for students and parents to engage with the LMS, further obstructing the successful implementation of the LMS. This study's results suggested that other issues, such as infrastructural problems, technical issues, and quality concerns also contribute to negative perceptions.

Confirming results of Masmali (2020) and Ohali et al. (2018), the findings suggested that many schools still do not have the proper infrastructure available and this can cause problems in terms of access to the platform. In addition, it seemed that the presence of technical issues such as incompatibility with certain devices and lack of notification messages further added to participants' negative perceptions. Experiencing such issues was said to make the technology less attractive and could potentially result in lack of usage, as has been also found by Hustad and Arntzen (2013). A last issue related to the fear that the adoption of Future Gate could inhibit the quality of traditional learning systems. For instance, some were concerned about the app replacing textbooks or not focusing as much on reading and writing skills. Other feared that excessive exposure to the internet could distract students from their studies. These findings were not supported nor contradicted by earlier research.

Following TAM, the results implied that lack of computers and proper Internet connection, the relatively high prevalence of technical issues with the system, and quality concerns could impede technology adoption as these issues contribute to teachers' negative perceptions of ease of use and usefulness of the technology. To solve these issues, participants of this study

suggested that with the support of the government, schools should invest in better IT infrastructure, a better trained IT department that can address technical issues in a time-efficient way, and proper training for teaching staff to increase their positive perceptions.

With regards to the latter, the researchers found that although many schools do organize LMS training and provide guidance with the aim of increasing digital literacy, some improvements to these training courses are necessary. In conclusion and following TAM, the findings of this study implied that with proper investments from the Ministry of Education and local schools, positive perceptions of ease of use and usefulness could be increased which would then lead to a successful implementation of Future Gate in K-12 schools.

CONCLUSION

The adoption of LMS in K-12 schools in Saudi Arabia is a relatively new trend. One of the country's most innovative projects is an initiative called "Future Gate", an LMS that has recently (and gradually) been implemented in all K 7-12 schools in Saudi Arabia. This study sought to investigate and better understand the knowledge and early experiences of Saudi high school teachers with this particular LMS. Twenty individual in-depth interviews with Saudi high school teachers who had experience with Future Gate were thematically analyzed. The results of this study were analyzed in the context of the Technology Acceptance Model (TAM). Three overarching themes were developed: understanding of Future Gate, positive perceptions and experiences with Future Gate, and potential pitfalls of Future Gate.

One major finding of this study was that participants had an excellent understanding of Future Gate and were far from opposed to this technology. Contrariwise, they perceived this LMS as symbolizing academic progress and improvement. Positive features included the ability to engage in learning activities outside the classroom environment, the facilitation of communication and transparency, and the management benefits that the platform offers to teachers, students, and parents. Although Future Gate was predominantly evaluated as a positive addition

to the educational system in Saudi Arabia, participants mentioned some difficulties and obstacles with the system. These included a disinterest and unfamiliarity of teaching with the LMS, lack of infrastructure, technical issues, and quality-related concerns.

In the context of TAM, the results suggested that with proper investments from the Saudi government and local schools, positive perceptions of ease of use and usefulness can be increased which would then lead to a successful implementation of Future Gate in K-12 schools.

Although these results provide a good overview of the most significant perceived advantages and limitations of Future Gate, more research is required on this subject – preferably a longitudinal study that can assess improvements in the reported pitfalls over a longer period of time.

RECOMMENDATIONS

Although many benefits to Future Gate were mentioned, the results of this study suggest that some teaching staff is still unfamiliar with and resistant towards the idea of adopting LMS in high school education. Proper training has been identified as a successful strategy to change negative perceptions, and therefore, the researchers recommend that Saudi high schools organize training sessions for teaching staff on the value and practical use of Future Gate and LMS in general.

Another major barrier was the unavailability of proper infrastructure in some schools. The problem is that if the infrastructure is not present, unfamiliarity and disinterest cannot be counteracted. Investing in proper IT infrastructure in high schools may solve this problem, and the researchers suggest for the local government to invest more in these technologies.

Some technical issues are also worth looking at as participants of this study seemed to experience some technical problems with Future Gate. The researchers know from earlier studies that technical issues can discourage usage of technology, and they highly recommend for the software developers of Future Gate and other LMS to minimize the prevalence of technical issues.

This study was conducted shortly after the nationwide implementation of Future Gate; yet,

the researchers do not know if time can indeed change perceptions and increase positive experiences; therefore, a suggestion for future researchers is to conduct a longitudinal study. Longitudinal students will make it possible to monitor obstacles more closely and accurately, which, eventually, may lead to a more successful implementation of LMS in Saudi Arabian K-12 education.

LIMITATIONS

The current study has a number of limitations linked to it. A first limitation is that the recruitment strategy for this study was a combination of voluntary and snowball sampling which may have limited the representativeness of this study. Because participants self-selected, it is indeed possible that only participants with positive perceptions of digitization were represented in the study. Further, only the views of Saudi high school teachers were captured, and the views of other stakeholders such as principals, administrators, or students were not represented. Another limitation relates to the research design. This study was undertaken soon after the nationwide implementation of Future Gate, and it is possible that at the time, teaching staff were not comfortable yet with Future Gate. It is plausible that if the study was conducted at a later stage, different results might have been obtained.

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