An Overview of Saudi Arabia's Education System and Contextual Factors Shaping the Adoption of E-Textbooks

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Abstract

An overview of factors influencing e-textbook adoption in Saudi Arabia's education system is the main focus of this paper. It outlines the cultural context, including the importance of religion and tribal traditions in shaping Saudi society. The discovery of oil enabled rapid development and the establishing of a formal education system, with the Ministry of Education (MoE), founded in 1953. The education system remains grounded in religious principles and is separated by gender. This paper focuses on public education. In the 1980s, Saudi Arabia implemented information and communication technologies (ICT) across sectors, including significant integration efforts by the MoE. Projects have aimed to transition towards e-learning including replace printed textbooks with e-textbooks. Although printed books are still used, e-textbooks enabled by QR codes were introduced in 2017 to provide online interactive content. The COVID-19 pandemic accelerated e-learning and e-textbook adoption as virtual learning replaced classrooms during lockdowns. By 2020, the Madrasati platform will have facilitated over 850,000 virtual classrooms. Though e-textbook use remains optional, factors like the high cost of printed textbooks increase motivation to transition. However, issues like limited student hardware access and digital literacy pose challenges. Overall, Saudi Arabia's education system has been shaped by its culture and is now transitioning digitally, driven by economic incentives and technology, especially following COVID-19 impacts. This overview provides helpful background on Saudi Arabia's unique education environment to inform e-textbook adoption research.

Keywords: E-textbooks, Saudi Arabia, Education system, Cultural context, ICT, COVID-19, Printed textbooks

1. Introduction

Technology integration within education has become a global phenomenon, with e-learning tools and digital textbooks increasing in popularity as supplements to, or replacements for, traditional printed books. However, incorporating technology into education systems manifests uniquely within individual national contexts, shaped by cultural, economic, and political factors. Saudi Arabia provides an illuminating example of how diverse influences shape the implementation of e-textbooks in schools. This paper observes Saudi Arabia's distinct educational environment and recent shifts towards adopting e-textbooks, enabled by developments in educational technology.

Saudi Arabia's education system has transitioned from its origins in a tribal society defined by Islamic traditions to a contemporary, digitally connected system serving over 5 million students. However, challenges remain between preserving traditional values and satisfying the demands of a developing nation. The discovery of oil catalysed Saudi Arabia's economic transformation, allowing tremendous investment in public education infrastructure. The government has undertaken initiatives to integrate information and communication technology (ICT) into schools to facilitate a transition towards e-learning. Nevertheless, access, teacher readiness, and cultural perspectives remain loads.

The COVID-19 pandemic necessitated an abrupt shift to virtual learning in Saudi schools. This accelerated the adoption of e-textbooks and online platforms as substitutes for physical classrooms. Factors such as the high cost of printed textbooks further incentivise digitising educational content. This paper overviews the cultural context, historical developments, and recent technological changes shaping Saudi Arabia's trajectory toward adopting e-textbooks. It offers a valuable background for research examining how these national-level factors influence e-textbook integration in schools and teacher adoption behaviour.

2. Historical Overview

Saudi Arabia is generally recognised to be the source of Islam, beginning at Makkah and Al-Madinah, two holy cities in the western region of Saudi Arabia. Because of this, Muslims around the world attribute importance to and have an appreciation of Saudi Arabia. The country can therefore be said to be of religious importance at a global level, and religion also has a significant impact on determining many of its domestic and foreign policies.

The Kingdom of Saudi Arabia is the second largest Arab country, as it occupies most of the

Arabian Peninsula. The statistics indicate that the population in 1999 was just over 9 million people; by 2023 it had reached more than 32 million [1]. Despite this dramatic rise, the increase in population does not present an issue in terms of space. Figures from 2022 show that the country would soon surpass 32 million inhabitants, with statistics that included Saudi citizens as well as non-citizens residing in the country. It should be noted that government age statistics also show that Saudi society is a young society in which the youth represent the vast majority (see Figure 1).
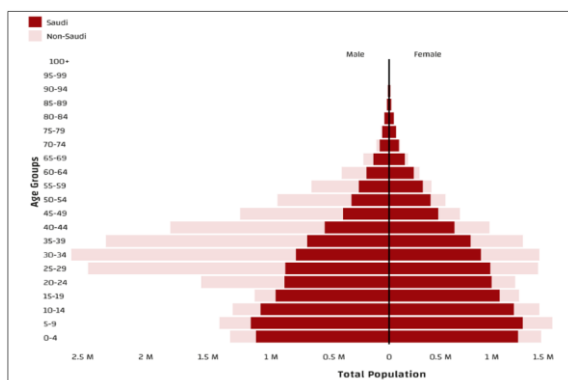

Figure 1. Saudi Population by broad age groups and gender, 2022 [1]

The factors such as religious, political, or geographic boundaries form an overview of cultural identity in Saudi Arabia. Arab culture and the religious character of the country play an influential role on the education system, social morals, traditions, responsibilities and practices of society. Moreover, traditional kinship and tribal customs still have an influence on the individual in society and may be the cause of success or failure, also in educational workplaces.

Politically, the system in Saudi Arabia is a monarchy; the country was founded in 1744 as a religious state. In 1902, the current structure of the Kingdom of Saudi Arabia (KSA) was formed when King Abdulaziz opened Riyadh, the country's capital city. In 1932, King Abdulaziz worked to unite the other provinces, which led to present-day Saudi Arabia. The authority of the kingdom is entirely with the king. He adopts all laws from the cabinet, while the Shura Council discusses with the cabinet the laws in their initial stages [2].

3. Economic Background

The year 1983 was a milestone in Saudi Arabia's development because of the discovery of oil. This discovery allowed the government to focus on building the systems of a newly grown country. Therefore, several ministries were established to serve development goals and organisational purposes. In addition to that, the discovery of oil enabled Saudi Arabia to become a rich country and made it eligible to join the group of the twenty wealthiest nations (G20) and to lead the summit in 2020.

Since 1970, national development plans have been launched every five years. Those plans aim to keep pace with the requirements of development at the individual and community level. Financial strength has allowed the Saudi government to regularly plan and initiate development projects in all areas. These development plans are drawn up into strategic plans, which are issued every five years and essentially form the policies and programmes of socio-economic development and include targets for every five years, including for the educational system [3].

The other milestone in the Saudi economy, Saudi Vision 2030, was launched by the crown prince, Mohammed bin Salman. This vision can be defined as a plan drawn up by the Kingdom of Saudi Arabia, to reduce dependence on oil derivatives, diversify the economy and improve investment in the public services sector. This includes infrastructure development, tourism and improving the means of recreation and entertainment.

Vision 2030 aims to focus on the strengths of the Kingdom, which can be summed up by three factors, namely: its religious status, as it includes the Two Holy Mosques, the destination of all Muslims; the investment power the Kingdom enjoys that has allowed it to build a more sustainable economy; and its strategic location that links Asia, Africa and Europe.

In terms of education, Vision 2030 looks at developing comprehensiveness: making education available to all local and global communities, as well as diversity in the curriculum to include different ages and follow technological developments that are in line with Saudi values. Vision 2030 also gives particular importance to people with special needs, providing them with appropriate support, and facilitating research [4].

Vision 2030 appears to be attempting to accommodate a more modern curriculum, in terms of science, learning and teaching methods, by introducing curricula that allow students to stay up-to-date with the latest developments in science and technology in order to improve their life skills.

To facilitate that, the MoE has set up development projects related to ICT and teachers, with roughly half of the country's budget dedicated to education and social care. In the 2021 economic plan, approximately 186 billion Saudi Riyals (£36,493 billion) were allotted to education. This part of the Saudi budget is dedicated to building laboratories to be used for education, developing the infrastructure and information technology at universities, institutes and training colleges, and refurbishing current school facilities.

4. Saudi Education

The 1930s was the beginning of formal education in the KSA, and a large-scale programme to establish schools throughout the country was launched by King Abdulaziz Al Saud. This program was under some pressure to expand educational opportunities, increase the rate of literacy and the number of instructors. With those under the age of 20 making up more than half of the population, the educational institutions in Saudi Arabia have had to handle a growing student number. The opening of the MoE marked the start of a new era for improving education in Saudi Arabia. It was established in 1953 as part of the Council of Ministers.

The late King Fahd bin Abdulaziz, who was prince at the time, was appointed the first Minister for Education. Appointing a member of the royal family to lead the new MoE is evidence of the Saudi government's strong desire to bring about an educational renaissance. Since then, the state has increased the number of schools to expand formal education at the state level. There were new schools were distributed among various cities and villages of Saudi Arabia, 48 'educational administrations' were established throughout the country's regions to assist the ministry in carrying out its duties; and state education for girls was established in 1959.

Although educational policy is unified across the whole Kingdom, these administrations hold power locally through which they can manage their schools, whether in terms of infrastructure or economics, and redistribute teachers according to the needs of the schools. As a result of this renaissance, investment in education has become one of the main goals of the Saudi Arabian National Development Plan. Most of the five-year plans contain two main principles: first, improving human resources and providing them with necessary training and education, and secondly, establishing comprehensive economic infrastructure.

Saudi Arabia's education system includes multiple levels and is free for all citizens and non-Saudi residents of the country. The first stage of Saudi Arabia's education system is a two-year pre-school education, during which male and female pupils are prepared for primary education. Children start nursery when they are four and go on to reception at age five. At the age of six, students must enrol in the primary stage, which is compulsory in the Saudi education system. At this stage, boys and girls are placed in separate schools with different curriculums in proportion to the nature of females, for example, female students have curricula related to housekeeping, detailing, and sewing. If a student passes their sixth year of primary school, they will be able to move on to the intermediate stage, if not then they must retake year six. The intermediate stage consists of three years, with students at this stage starting from 12 years old to 14 years old. The final stage of public education in Saudi Arabia is the secondary stage or high school. Once they have passed the intermediate stage, a student is eligible to begin secondary education, where the students are aged between fifteen and nineteen. The curricula for this phase are designed to allow each first-year student to learn all essential subjects, for instance, Religious Studies, Arabic, Natural Sciences, Administration and Social Sciences. After that, each student is able to choose one of the major subjects to study for the next two years. When a student passes this stage, they become eligible to choose between attending a vocational training institution or going directly into employment. They also can enrol into higher education.

The academic year in the Saudi education system consists of three semesters. Each semester is 13 weeks long with each day having between five to seven sessions and an additional two weeks for exams. Although the academic year at the high school stage is similar to the primary and intermediate stages, high school students can also choose to enrol in the summer semester, which enables students who have fallen behind their peers to catch up. Students can also fast track the secondary stage by attending summer school.

5. Educational Policy in Saudi Arabia

The general principles on which the Saudi educational process is based emphasise the importance of an individual's duty towards their Lord and religion and towards the law, to meet the needs of society and achieve the goals of the nation [5]. Therefore, it is necessary to consider the principles on which the education policy in Saudi Arabia is based. The policy has a religious basis and emphasises the need for a religious aspect at all levels of education. In addition to this, Saudi Arabia's educational policy was built to meet the needs of society and global development.

6. ICT in Saudi Arabia

Information and communication technologies (ICT) have a fundamental role in the economies of many countries, and the Saudi government classifies their implementation as an essential goal in its plans. In the 1970s, the field of ICT underwent tremendous changes. Since then, the application of information technology has rapidly expanded to many fields, improving productivity and management in many fields such as banking, industry, e-commerce, education and healthcare. However, compared with other developed countries such as the United States, the United Kingdom, Australia and Canada, Saudi Arabia's ICT is still relatively new. Information technology systems have been rapidly deployed in both the private and public fields. Therefore, many companies now integrated information technologies

in one way or another to simplify and enhance the performance and efficiency of their processes. This is more obvious in government departments and larger companies than in smaller ones.

In addition, Saudi Arabia has the largest and fastest-growing ICT market in the Arab region. Despite this growth, deploying ICT in an environment such as Saudi Arabia is a complicated process that presents many obstacles. There are not only scientific and technological issues, but perhaps the most important of them are cultural, educational, economic, political, geographical and social issues. The main obstacles met by many institutions in Saudi Arabia when using information technology include a lack of administrative support: the need for IT planning, shortage of qualified human resources and inadequate training [6].

7. ICT in Saudi Schools

Saudi Arabia's MoE has set policies stipulating that the education sector must keep pace with the technological development occurring in the rest of the country [5]. Due to this, in 1985, computer science began to be taught at secondary schools; students learned the principles of computers and the basics of programming. This review, however, will focus not on technology itself as a subject taught in schools, but instead on how the ministry is implementing it in schools.

In order to illustrate the MoE's efforts in employing appropriate technology in the educational process, the author cites his personal experience. The author has worked in the MoE since 2000, specifically in the Department of Educational Technologies (DET), and the Information Technology Centre (ITC). The mission of those departments in the Saudi education administration is a vital one, as it is concerned with providing educational supplies to schools. One of the tasks carried out by these departments is to provide statistics on the number of schools, students and teachers in the country, so that decision-makers can provide the devices that make schools eligible for e-learning. For example, the ITC is keen to connect every school to the internet, regardless of its location. Some are linked using fibre-optic connections, and rural schools are linked via broadband. In addition, schools are provided with projectors, smartboards and computer stations for each class, as well as computer labs for the whole school. The MoE has introduced some technological projects with the aim of transitioning Saudi Arabia's educational system to e-learning.

8. The Ministry of Education Projects

The MoE has launched various national projects to develop the education system in the Saudi Arabia. The King Abdullah Project, for example, aims to reform the education system in Saudi Arabia and enhance the quality of learning and education. This project has gone through two phases. The first was the aim to provide 50 secondary schools with different technologies. The second phase aimed to integrate ICT in teaching at all education levels, it targeted 333 schools. This project has since ended, as it became too expensive.

Among the ambitious projects presented by the MoE is the National Education Portal (iEN) project. It is a free and secure portal that supports digital learning and teaching processes. iEN offers a reliable e-learning environment to students, teachers, school managers, supervisors and parents. The students draw knowledge from it, communicate with their teachers, and exchange information with their peers. The portal supports the teachers' creativity in the classroom, acts as an incubator for cognitive production, and provides a channel to link students with what they have learned in order to monitor and enhance their learning.

At the time of drafting this paper, in the About section of the iEN portal, a page provided the statistics of the portal's user-offered products. (See Figure 2). It indicates that over 2,300 e-textbooks and 13,800 activities are available; and additional services are anticipated. These e-textbooks encompass all subjects and all levels of schooling. Students utilising the iEN can download e-textbooks as PDFs, keeping in mind that pdf-formatted e-textbooks are not interactive, they contain a QR code for students to access an interactive lesson online (See Figure 4) [7].

The MoE encourages teachers, students and parents to use the iEN to download e-textbooks and activity papers, in addition to watching recorded teaching sessions. This is in line with the MoE's goal of printed textbooks no longer being needed at some point in the future. The ministry's approach to e-learning and their plan to bring about this shift in the Saudi education system presents a unique educational policy context for exploring teachers' perspectives regarding e-textbooks and their use behaviour, which is the focus of the present study.

Figure 2. Product statistics on the iEN portal. (Adapted from the About section of the portal [7]

In 2019, based on Saudi Vision 2030, the MoE launched Future Gate to gradually transform learning and aid the transition to digital education. In addition to that, the project helps to transfer knowledge to the student, as it supports the development of the scientific and educational capabilities of teachers. This project also has the aim of transforming schools into e-learning environments, moving away from the traditional paper-based environment by using learning management systems (LMS). It also aims to expand teaching and learning processes beyond the classroom environment in order to make education more enjoyable due to positive interaction between students and teachers [8].

The COVID-19 pandemic disrupted the completion of the Future Gate project, along with several other plans and programs. School closures in 2020 led to a review of Future Gate's effectiveness as a distance learning tool, revealing that it was not designed for this purpose. As a result, a new platform called Madrasti was developed to address the growing need for virtual learning during lockdowns. This new project's significance lies in its ability to provide an effective virtual learning environment tailored to students' unique needs during the pandemic.

8.1. The Madrasati Platform

'*Madrasati*' is an Arabic word meaning 'my school'. It is an e-learning management system, launched at the beginning of the academic year 2020/2021. This project is the MoE's latest project, thus warranting its own section. It constitutes a significant leap forward for education in Saudi Arabia, as students and teachers can carry out the entire educational process remotely. *Madrasati* is considered mandatory for everyone, distinguishing it from other MoE projects.

The aim of *Madrasati* is to provide an alternative distance learning environment for face-to-face education due to the health restrictions imposed by the pandemic. It includes many electronic educational tools to support teaching and learning and contributes to achieving the educational goals of the curricula and courses. The platform also supports the acquisition of skills, values and knowledge for students, compatible with the digital requirements of the present and the future [9].

The virtual classroom is a secure environment, the instructor is able to connect with students, hold discussions with them, respond to their questions, assign them tasks and electronic activities and motivate them to perform well. *Madrasati* also offers over 45,000 instructional resources that accommodate for individual differences among students, such as visual and animated movies, educational games, augmented reality, 3D objects, interactive and entertaining experiences, instructive stories and novels. In addition, it includes resources for educational planning and design, as well as evaluation, such as electronic exams and question banks with more than one hundred thousand questions for the majority of courses [9, 10].

Since interactions between teachers and students, students and content, and among students are among the most important aspects of the e-learning experience, *Madrasati* provides discussion forums that enable students to interact, thereby enabling this vital part of their socialisation. To enhance learning both students and teachers can interact in real-time using chat rooms and communicate asynchronously via email and teacher rooms to receive feedback on electronic activities and assessments.

Moreover, e-textbooks are available on the portal, and teachers can obtain them directly from there. Additionally, a performance reporting system with indicators enables school administrators, educational supervisors and teachers to track and improve performance [10].

9. Use of e-Textbooks in the Context of Saudi Education

The education system in Saudi Arabia guarantees every student free copies of their textbooks at the beginning of every academic year. These textbooks contain specific curricula and lessons, dedicated to each stage of study separately; and each subject has its own book, or series of books. For example, there is one dedicated book for religious studies, more than one book for Arabic, two books for English: one for the topics and the other for activities and exercises. This also applies to other subjects according to their requirements. In addition, the teacher receives a special book containing tools to help communicate information and solutions for the activities in the students' books. These books are printed by the MoE and distributed free of charge to students and teachers.

Designing, printing and distributing these textbooks takes up a significant proportion of the education budget. According to the Saudi Minister of Education's statement, producing books costs about 460 million riyals annually (around £91 million). More than 700 different titles are printed each year, they are copied, printed and distributed according to the number of students [5], which seems wasteful because the textbooks are not recycled or used for the following year's intake of students. Such high costs mean that serious consideration had to be given to dispensing with printed books and producing e-textbooks instead. Consequently, work on e-textbooks began in 2017, starting with the implementation of bar-code QR technology into the pages of paper books. QR enabled students and teachers alike to benefit from interactive enrichment by scanning the QR code, which allows quick access to the educational electronic portal and access to e-textbooks by downloading them through iEN.
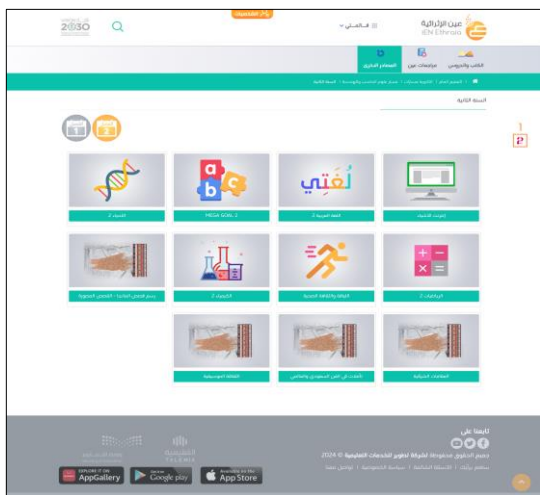
Figure 3. A screenshot of the iEN with links to e-textbooks [7]

Figure 3 shows a screenshot of the iEN which has links to e-textbooks that students can download. Figure 4 is an image of a paper textbook with a QR code printed in the corner.

Although resources for all subjects are now available in electronic format, the process of printing and distributing paper books continues, meaning that the use of e-textbooks remains optional at this stage. There could be several reasons why printing and distributing paper books continues in Saudi Arabia, despite the availability of electronic textbooks. One possible explanation could be that not all students have access to the digital tools required for e-textbook access, such as an iPad or a smart pen. This could be due to economic status, geographic location or infrastructure limitations. According to the General Authority for Statistics (GASTAT) in Saudi Arabia, the percentage of households with Internet access was 64.3% in 2019. This suggests that a significant portion of the population may not have access to the digital tools necessary for e-textbook access. Additionally, even among households with internet access, not all may have the hardware or software to access e-textbooks, such as tablets or e-readers. Furthermore, while the use of digital tools for education has been increasing in recent years, there may still be some resistance or reluctance to fully adopt e-textbooks as a primary mode of learning. Some students and educators may prefer the tactile experience of reading a physical book or may be concerned about the potential distractions of digital devices.

As an ITC supervisor in MoE, the author had first-hand experience with witnessing various initiatives in Saudi Arabia to increase access to digital tools for education, in order to address the issue of hardware access. For example, the MoE has launched programs to distribute tablets to students in public schools.

It has partnered with telecommunications companies to provide affordable internet access to students and educators. The issue of hardware access is an important consideration when it comes to adopting e-textbooks in education. While the availability of e-textbooks provides a promising opportunity for increased accessibility and convenience, it is important to ensure that all students have access to the necessary digital tools in order to participate fully in e-learning.

Therefore, the adoption of the *Madrasati* platform and distance learning allows teachers to work closely with e-textbooks as they are automatically provided with a copy of each e-textbook while preparing and delivering their lessons (see Figure 5).
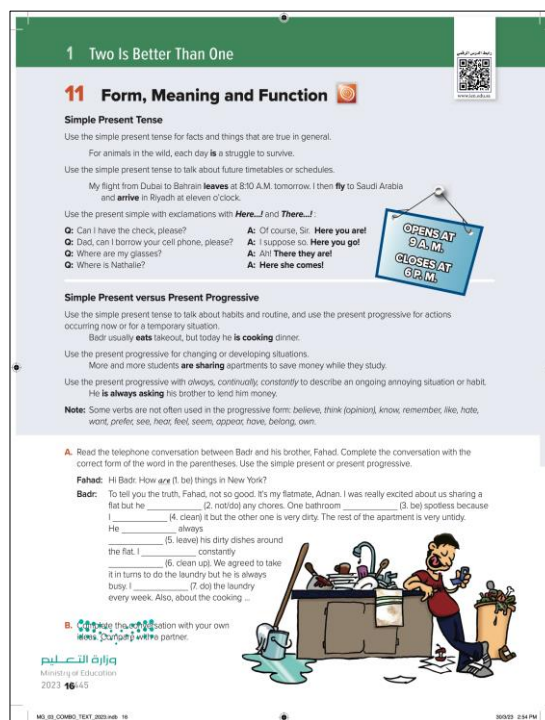

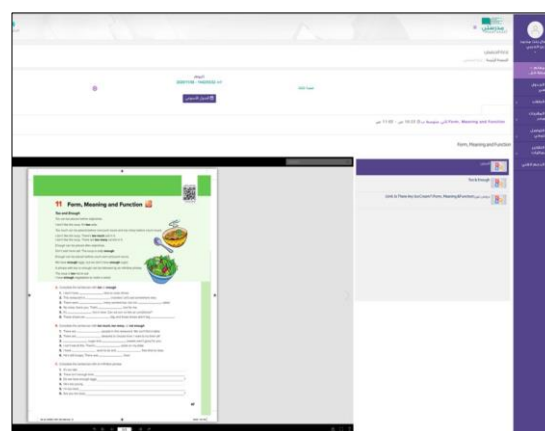Figure 4. Textbook with QR code printed in the corner [7]

Figure 5. A screenshot of a teacher's Madrasati interface

10. Educational Technology and COVID-19

The COVID-19 pandemic has exposed the vulnerabilities of our traditional educational systems. The pandemic is exacerbating various inequalities in terms of access to and quality of education between low- and high-income groups, between different genders, races and ethnicities [11]. This epidemic could potentially cause a significant learning gap for students, and the potential for this to be much more pronounced for students from more disadvantaged parts of society [12]. Although students in the past have been affected by health crises such as Ebola and H1N1, the extensive scale of the COVID-19 pandemic, along with its widespread impact through strict lockdowns and the shutdown of educational institutions, has left nearly 87.4 per cent of students around the world in a state of [13]. The pandemic has caused the global economy to slow down and has had a negative impact on many different industries.

Despite these problems, a few industries, such as educational technology, have witnessed growth due to shifting user preferences. There has been an increase in the number of people subscribing to educational technology companies, including BYJU, the world's largest educational technology company. After the pandemic began, there was a 200 per cent increase in the number of people subscribing to the company [14]. In Wuhan, where the pandemic was first reported, more than 80 percent of students are now attending online classes via Tencent K-12 software. Global education technology corporations are developing platforms to produce a comprehensive learning environment for teachers and students. For instance, ByteDance, a Chinese internet technology company, started offering Lark, educational software for teachers and students with the no time limit for video meetings, translation functions, real-time edit sharing of documents and smart scheduling in addition to other features [14]. To enable this, the company improved the servers' data centres and engineering capacities to guarantee reliable and stable connections. Similarly, Alibaba's e-learning platform DingTalk took full advantage of the potential of Alibaba Cloud products and deployed around 100,000 servers within two hours in March 2020. Even media outlets like the British Broadcasting Corporation (BBC) are powering virtual learning with a programme called Bitesize Daily and three hours of primary school programming on CBBC; to offer curriculum-based learning for children across the United Kingdom. The latest report by an educational technology company, GSV Ventures, has projected that the educational technology market will grow to 1 trillion US dollars by 2026, a rise that can be attributed to the COVID-19 pandemic [15].

Among 195 countries globally, 191 counties are affected by COVID-19 [16]. Around the world, 429 universities have closed and begun online courses and e-learning [17]. COVID-19 has changed the entire scene of the education sector. During this global pandemic, managers, teachers and students have faced many problems in achieving the goals of general education. In March 2020, the Centre for Disease Control and Prevention [18] in the US, published a guide on alternative teaching approaches to deliver classwork and homework to students. Popular virtual classroom applications, such as Zoom, Teams, Google Classroom and Blackboard, have played an essential role in the shift from face-to-face courses to e-learning practices [19]. Circumstances brought about by the pandemic have affected the entire education system and precipitated a new era of e-learning. Although e-learning tools can be a challenge for some teachers, most are implementing the new methods using devices and Internet tools for stable learning.

In Saudi Arabia, there are now 20 television channels (iEn Educational Channels) broadcasting daily lessons for all grades, using both satellites and YouTube [7]. As introduced above, the iEn National Education Portal provides a comprehensive collection of educational resources, such as digital textbooks in PDF format, recorded lessons on a broad range of topics applicable to various disciplines, educational video games and 3D simulations, and other educational tools and information. All of these resources were developed over several years before the pandemic. They were initially intended to counter the effects of educational opportunities along the southern border, where schools on the frontier have been closed since autumn of 2017 to protect students from the random attacks by Houthi rebels in Yemen [13]. During the forty days of school closure in Saudi Arabia, Future Gate and the iEn National Education Portal were utilised. Despite the fact that both are non-interactive, they facilitated remote instruction during the 40-day school closures at the time. Complete interactivity between students and teachers needs a learning management system in which each student is connected to their teachers, classmates and school, and where teachers and school administrators can manage classroom activities [13]. In a well-established learning management system, teachers can typically conduct their scheduled classes online (synchronised learning), record their classes so that students can watch them again (a synchronised learning), assign students homework and exams, grade submitted assignments, and provide the necessary assessments and feedback. Hence, solutions for learning management systems are required to provide data that can assist teachers and educational administrators in evaluating, among other things, the quality of teaching and learning, student achievement and attendance.

The start of the 2020/2021 academic year saw the continued closure of schools due to the pandemic. The

Saudi MoE had the benefit of having previously implemented an e-learning scheme at its southern border that it was able to distribute to other regions. The *Madrasati* platform was adopted as a virtual school and used alongside the iEn Educational Channels. *Madrasati* facilitated student-teacher interactions in more than 850,000 virtual classrooms across the platform for all school levels [10]. These virtual classrooms were built using Microsoft Teams, with each teacher linked to their students (see Figure 6). This was in order to continue the educational process and invest all the educational tools available on the platform to improve learning outcomes.

Figure 6. A screenshot of a teacher's TEAMS interface

The students demonstrated their commitment to attending virtual classes, interacting with teachers, carrying out the activities and duties required of them on specified dates, and using the tools and enablers of the platform and the iEn portal in support of their educational journey. *Madrasati* includes in-built performance indicators published by the MoE that reveal the interaction between students and teachers via the platform, their commitment to schedules, and how interactive the lessons are. The MoE considers it to be as efficient in delivering material as the traditional manner of educating pupils [10].

The role of families and parents in the remote educational process contributes to the cognitive and psychological preparation of their children. It allows them to monitor their commitment to this new way of doing assignments, and to build an integrated educational system, where virtual classes reveal the capabilities of students and teachers, whether in receiving information, or in how teachers have adopted different and varied methods of teaching. New methods aim to get students to participate in lessons that unlock broad areas of thought and creativity in a way that keeps pace with the curriculum.

The platform has grown to an extent that it is utilised by 4,215,027 students, or 84% of the 5,010,027 students enrolled in the three academic levels. In addition to this, 411,963 teachers of both genders and 20,709 school leaders in various regions and governorates have also used the platform [10]. Furthermore, school leaders can use *Madrasati* to follow educational progress, design study schedules, communicate with students who are absent as well as those in attendance, send follow-ups after classes and provide technical support. Educational supervisors have also contributed to overseeing the educational process and school performance and supervising the preparation of the electronic calendar and its implementation [10].

11. Discussion

The overview of Saudi Arabia's education system and the factors influencing e-textbook adoption reveals several critical points for discussion.

Firstly, religion and cultural traditions significantly influence Saudi society and education. Gender separation in schools stems from prevailing Islamic-rooted social norms. This exemplifies the overarching cultural forces that shape Saudi Arabia's education system.

Secondly, Saudi Arabia's rapid economic development, catalysed by oil revenue, enabled substantial investments in education infrastructure and ICT integration. Large-scale projects like Madrasati and Vision 2030 demonstrate the government's push to modernise schooling. However, increasing access to technology does not directly translate into successful adoption. Challenges like teacher readiness and student tech literacy highlight gaps impeding e-textbook implementation.

Thirdly, high textbook costs incentivize digitization, yet systemic and cultural barriers persist, as evidenced by the continued dominance of printed textbooks despite initiatives like QR codes and the iEN portal. The shift to virtual schooling, brought about by the pandemic, required acceptance rather than readiness.

Finally, research should compare national policy goals to teacher and student e-textbook adoption patterns. Studies must examine teacher integration practices, perspectives influencing use, and student engagement to understand on-the-ground realities essential for implementation.

In summary, Saudi Arabia presents a complex landscape of cultural influences, government modernisation efforts, and practical adoption challenges surrounding e-textbook integration. Gaps likely remain between ambitions for educational technology and realities in schools. Focused research can elucidate this context to inform evidence-based policies.

12. Recommendations

Based on the discussion, several recommendations can be made for research and practice:

Conduct mixed-methods studies examining teacher adoption of e-textbooks, including surveys and interviews capturing perspectives, attitudes, challenges, and usage behaviours.

Investigate relationships between teacher demographics, technology readiness, pedagogical beliefs, and e-textbook adoption patterns. Identify influencing factors.

Explore student engagement and learning with e-textbooks compared to printed texts using experimental studies. Assess the differences in outcomes.

Review teacher professional development programmes for technology integration. Identify gaps in preparing teachers for e-textbook usage and make recommendations for improvements.

Increase qualitative research giving voice to women's experiences as teachers and students amidst cultural gender norms. Capture perspectives on e-textbook usage.

Focused research and strategic investments are needed to support effective e-textbook adoption and realise the potential benefits of educational technology in Saudi Arabia's distinct cultural context.

13. Conclusion

The research study provides a comprehensive background of Saudi Arabia's unique education environment and key factors shaping the adoption of e-textbooks. The cultural context, grounded in Islamic traditions, significantly influences education policies and gender norms in schooling. Saudi Arabia's oil wealth enabled investments in school infrastructure and ICT integration projects to modernise the system. E-textbook initiatives like QR codes in printed books and platforms such as iEN and Madrasati reveal incremental steps towards digitisation. However, systemic and cultural barriers likely impede full adoption.

The abrupt shift to virtual schooling during the COVID-19 pandemic accelerated e-textbook usage out of necessity. Nevertheless, readiness remains questionable, as teacher preparation, student tech access, and underlying perspectives should have been addressed proactively. More gaps may exist between the government's ambitions for educational technology and the on-the-ground realities in schools.

Targeted research is needed to elucidate this complex landscape. Examining teacher and student experiences with e-textbooks could provide nuanced insights into adoption behaviours. Cost-benefit analyses and reviews of professional development programmes could inform policies guiding strategic investments. Focused efforts to understand and address barriers can enable Saudi Arabia to harness the full potential of e-textbooks within its unique cultural context. This will require a collaborative approach, aligning top-down vision with bottom-up classroom change.

14. References

[1] Statistics, G. A. F. (2023). Latest Statistical Releases. General Authority for Statistics. https://www.stats.gov.sa/en/statistics-overview. (Access Date: 19 July 2023).

[2] AlRushaid, W. (2010). Strengthening of national capacities for national development strategies and their management: An evaluation of UNDP's contribution. Country Study–Saudi Arabia.

[3] Planning, M. o. E. a. (2020). Development Plans. https://www.mep.gov.sa/en/development-plans. (Access Date: 20 November 2020).

[4] Vision2030. (2020). Vision 2030. Kingdom of Saudi Arabia: Vision 2030. https://vision2030.gov.sa/en. (Access Date: 7 January 2021).

[5] Education, M. o. (2017). The Saudi educational general principles. https://old.moe.gov.sa/ar/PublicEducation/ResidentsAndVisitors/Pages/TheGeneralPrinciples.aspx. (Access Date: 12 November 2020).

[6] Al-Soma, A. (2008). Saudi E-government "Yesser" Plans and Achievements. Electronic/Mobile Government in Arab States: Building Capacity in Knowledge Management through Partnership.

[7] iEN, N. E. P. (2024). National Education Portal (iEN). https://ien.edu.sa/. (Access Date: 10 January 2024).

[8] Tetco. (2022). Tetco For Educational Technologies. http://tetco.sa/. (Access Date: 20 October 2022).

[9] Alkinani, E. A., and Alzahrani, A. I. (2021). Evaluating the usability and effectiveness of madrasati platforms as a learning management system in Saudi Arabia for public education. International Journal of Computer Science and Network Security, 21(6), 275-285.

[10] Madrasati. (2022). Madrasati, https://backtoschool.sa/home/about. (Access Date: 15 December 2022).

[11] Toquero, C. M. (2020). Challenges and Opportunities for Higher Education Amid the COVID-19 Pandemic: The Philippine Context. Pedagogical Research, 5(4).

[12] Dhawan, S. (2020). Online learning: A panacea in the time of COVID-19 crisis. Journal of Educational Technology Systems, 49(1), 5-22.

[13] Jordan, K., David, R., Phillips, T., and Pellini, A. (2021). Education during the COVID-19: crisis Opportunities and constraints of using EdTech in low-income countries. Revista de Educación a Distancia (RED), 21(65).

[14] Forum, W. E. (2020). The COVID-19 pandemic has changed education forever. This is how. https://www.weforum.org/agenda/2020/04/coronavirus-education-global-cov

id19-online-digital-learning/. (Access Date: 8 November 2020).

[15] Moe, M., and Rajendran, V. (2020). Dawn of the Age of Digital Learning An Acceleration of Trends That Have Been Building for Years. @gsvventures. https://medium.co m/gsv-ventures/dawn-of-the-age-of-digital-learning-4c4e3 8784226. (Access Date: 17 February 2021).

[16] Nations, U. (2020). Startling disparities in digital learning emerge as COVID-19 spreads: UN education agency. United Nations. https://news.un.org/en/story/2020/ 04/1062232

[17] UNESCO. (2020). Education: From disruption to recovery. https://en.unesco.org/covid19/educationresponse. (Access Date: 12 March 2021).

[18] CDC, C. f. D. C. a. P. (2020). Coronavirus Disease 2019 (COVID-19) | CDC. Centers for Disease Control and Prevention (CDC). https://www.cdc.gov/coronavirus/2019-ncov/index.html

[19] Katherine, S. (2020). Zoom for Educators: How to Set Up Virtual Classrooms for Distance Learning | GetVoIP. https://getvoip.com/blog/2020/04/08/zoom-for-educators/. (Access Date: 19 March 2021).