

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).

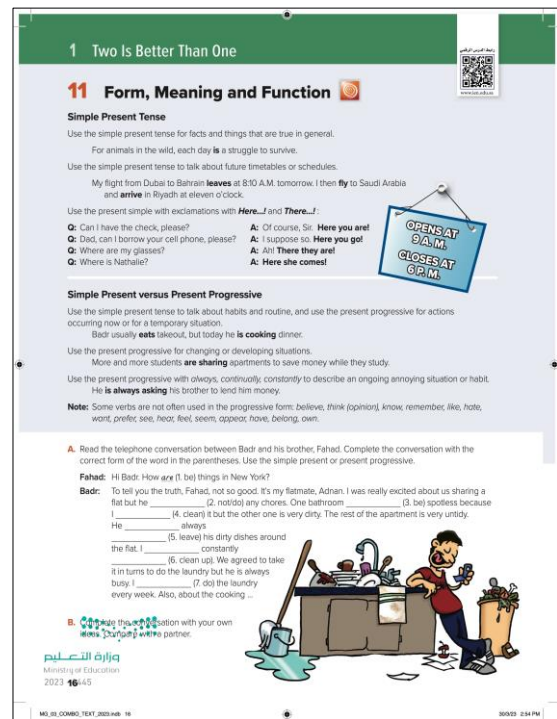


Figure 4. Textbook with QR code printed in the corner [7]

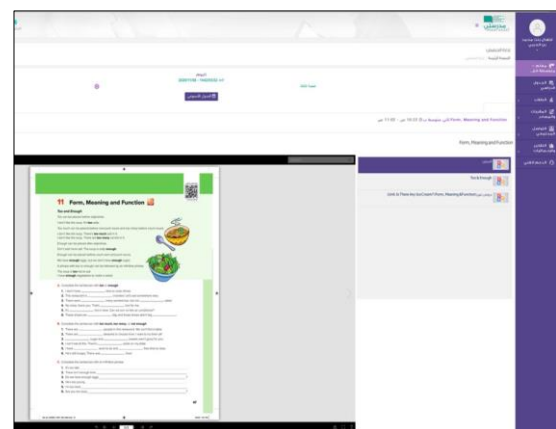


Figure 5. A screenshot of a teacher's Madrasati interface

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 countries 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

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