Redesigning the User Interface Design for the KPM eTextbook Reader Application: A Case Study Among Terengganu School Students

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ABSTRACT

The unprecedented global COVID-19 pandemic has caused significant changes in our lives, especially in social, economic, and political spheres. The importance of e-textbooks has been emphasized in the education sector following the pandemic, which demonstrated the need for this technology for students to access their textbooks or workbooks. When students cannot attend school physically, the Malaysian government-owned KPM eTextbook Reader app allows them to access e-textbooks. However, according to school teachers, during the early stages of the movement control order (MCO), students needed help fully utilizing the KPM eTextbook reader due to various factors influencing their acceptance of the app, including its user interface design (UID). As a result, the purpose of this study is to reconceptualize the UID of the KPM eTextbook Reader application to provide the best learning experience for Terengganu secondary school students. This study opts for a qualitative study in which the researcher interviewed five secondary school teachers from Terengganu. Based on the significant findings, this study discovered that the organisation of the books and content are the most important make-or-break factor regarding the UID in the KPM eTextbook Reader app.

INTRODUCTION

The Malaysian Ministry of Education oversees Malaysia's education system. Malaysian education is available in public, private, or independent schools. Primary and secondary schools are the focus of the educational system. The ministry, not the state government, determines the curriculum and other aspects of primary and secondary school education. Malaysian education is divided into several levels: preschool, primary school, secondary school, and higher education (Ministry of Education, 2013). Primary education has been mandatory in Malaysia since 2003, thanks to an amendment to the Education Act 1996 in 2002. However, secondary education has yet to be made compulsory, despite the government's commitment in the Malaysia Education Blueprint 2013-2025 to make lower secondary and upper secondary education

compulsory by 2015 (Asia Strategy & Leadership Institute, 2020). The Primary School Standards-based Curriculum (KSSR) and Secondary School Standards-based Curriculum (KSSM) were implemented in 2017 to holistically develop students so that they can compete globally in the twenty-first century (Hashim et al., 2016). It is consistent with the Second Wave agenda, the Malaysian Education Development Plan (PPPM) 2016 to 2020. The curriculum at KSSM is divided into core subjects, compulsory subjects, additional subjects, and electives. Interestingly, implementing KSSM allows students to determine their preferred direction and career field earlier.

A fundamental goal of any educational system is to provide its students with the knowledge and skills they need to succeed. The teaching and learning process were to be conducted online after the COVID-19 pandemic hit and restrictions on face-to-face meetings were imposed. The massive disruption caused by the COVID-19 pandemic reportedly affected at least 1.5 billion students and 63 million primary and secondary teachers worldwide in 2020, with school closings in 191 countries (Heng et al., 2021 & Buchanan et al., 2022). Upon the imposition of Movement Control Orders (MCO) in Malaysia, the Ministry of Education (MoE) implemented home-based teaching and learning (PdPR) to aid in the continuation of our education system during the pandemic. According to Rabindarang et al. (2021), PdPR requires the availability of an internet connection, real-time learning, and devices. Hence, during the distressed time, M-learning has grown exponentially to assist teachers and students in continuing their curriculum. M-learning is a learning method that uses mobile technology in teacher teaching and learning. The flexible mobile nature allows this learning to be easily carried out regardless of time, place, and distance boundaries (Saikat et al., 2021).

Along with the extended period of school closures that have shown the growing importance of M-learning, the benefits of mobile devices have changed teachers' views from seeing them as gadgets for personal use to educational tools (Begaliyeva et al., 2022). The employed PdPR-based M-learning medium used by educators from kindergarten to higher education in Malaysia include WhatsApp, Telegram, Google Classroom, Zoom meetings, Google Meet, Google Forms, and YouTube. In fact, as of 22 Apr 2020, the data revealed that Malaysians had ranked third for PdPR usage of the Google Classroom programme during the PKP implementation period and fifth globally during the previous twelve months (Samad et al., 2024). The COVID-19 pandemic has forced many students in Malaysia to rely on digital learning resources on various online platforms, including Google Classroom and Zoom meetings. Also, due to students needing help to retrieve their textbooks during MCO, they must rely on e-textbooks. E-textbooks (abbreviation for electronic textbooks), digital textbooks, or e-texts are defined by (Roberts et al., 2021) as digital versions of a text that can be read on a computer or mobile or an e-reader device. During this time, the KPM eTextbook Reader, a non-commercial application designed for Malaysian primary and secondary school students to obtain textbooks digitally, was used in eight schools under the Sekolah Menengah Imtiaz Yayasan Terengganu units to help both students and teachers with their PdPR sessions. Even though the KPM eTextbook Reader has received 100,000 downloads, some areas can be improved.

This study adopted the technology acceptance model (TAM) concept to assess the KPM eTextbook Reader acceptability. According to Mizher et al. (2023), in the Technology Acceptance Model (TAM), two factors determine whether a computer system is accepted by its potential users: (1) perceived usefulness and (2) perceived ease of use. Please refer to Figure 1 for Davis' TAM model. The emphasis on the potential user's perceptions is a key feature of this model. That is, even if the creator of a given technology product believes it is useful and user-friendly, it will only be accepted by its potential users if those beliefs are shared (Sagnier et al., 2020).

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┌──────────────────┐
│    Perceived     │
│    usefulness    │────────┐
└──────────────────┘        │      ┌──────────────┐     ┌──────────────┐     ┌──────────────┐
                            └────▶ │  Attitude towards │───▶│ Behavioural  │───▶│ Behavioural  │
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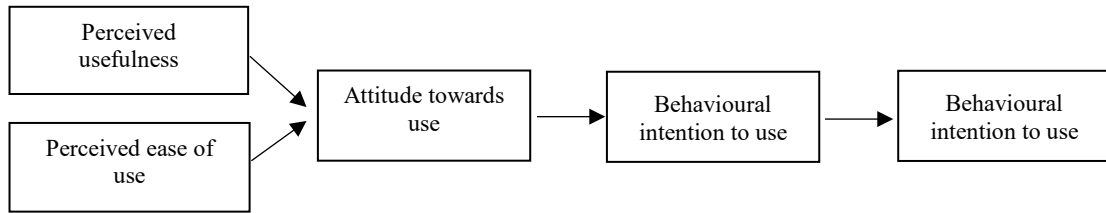
Fig. 1. The Technology Acceptance Model (TAM) used in this study

This study aims to reconceptualise the user interface design of the KPM eTextbook Reader application to provide the best learning experience for Terengganu secondary school students.

LITERATURE REVIEW

E-Textbook

For decades, printed textbooks have been used as syllabus material to guide classroom teaching and learning sessions. However, significant shifts are occurring as the world develops and becomes more familiar with technologies. The widespread growth of e-textbooks over the past decade can be attributed to the practical enhancements made available to readers, including accessibility, availability, survivability, and, most importantly, environmental responsibility. Several studies have found that e-books and e-textbooks have more features than traditional media, such as portability, text searching capabilities, quizzes, online links, interactive learning activities, bookmarking, and annotations (Tarmizi et al., 2021). Since the pandemic, there has been a massive push to use e-textbooks. In a September 2020 survey of 300 teachers and 100 administrators, 67% of teachers said they used e-textbooks more that year than the previous year. They have admitted that e-textbooks have enabled them to teach remotely. The students, according to the teachers, enjoyed using e-textbooks. According to the researcher, these digital resources, particularly e-books/e-textbooks, and audiobooks, are a wise investment for the future (Kamaruzaman et al., 2012).

M-Learning

The COVID-19 pandemic has impacted the education industry, making physical teaching activities difficult. As a result, M-learning has grown in importance, and the technologies and platforms used to facilitate learning sessions have greatly aided throughout the difficult times. M-learning platforms include personal digital assistants (PDAs), mobile phones, laptops, and tablet PC technologies (Kamaruzaman et al., 2012). However, the development of m-learning in Malaysia did not begin during the pandemic; rather, it has been demonstrated gradually by strengthening ICT elements in the education system. First and foremost, Frog VLE is an effort toward m-learning. It is a cloud-based learning platform that connects school managers, administrators, teachers, and students. This system, which is a learning content management system, allows teachers to distribute materials to their students remotely. Teachers, students, and parents can use the network to exchange educational materials for interactive learning and dynamic conversations. Aside from Frog VLE, the government has established The Teaching of Mathematics and Science in English (PPSMI), Cluster Schools of Excellence (SKK), High-Performance Schools (SBT), and the Smart Schools Programme to incorporate ICT culture into teaching and learning (Samad et al., 2024).

M-learning meets students' educational needs without the constraints of traditional classroom settings. Students can use the platform to participate in structured educational activities outside the traditional classroom and access course materials anytime. Furthermore, it is noted that M-learning apps are an important medium in learning because students interested in this technology will find their pragmatic worldview within the context of logical experience and achieve their learning objectives (Samad et al., 2024). The state of the arts has demonstrated the benefits of mobile learning, such as how it fosters student

creativity, improves self-control, fosters collaborative skills, and improves academic performance (Victoria et al., 2023).

User Interface (UI)

The user interface (UI) is the point of interaction and communication between humans and computers. It can also refer to how users interact with a programme or website (Churchville, 2021 & Huddin et al, 2018). Display screens, keyboards, and the appearance of a desktop are tangible examples. Intangible examples, on the other hand, include icons, buttons, layouts, images, and all other aspects that cover the interlinkage of users with the app or website. Because the UI communicates with the user on the system's behalf, an efficient UID encourages communication with the user. The user interface (UI) is arguably the most important component of any computer-based system or product (Bodker, 2021). A well-designed interface can seriously impede a user's access to an application's processing capacity. As a result, it is critical to invest in effective UID because, in addition to serving as a representation of a product or company, a good UI can encourage the user to use the app, brand, or product again (Wang et al., 2015). Based on the aesthetic-usability effect, people tend to believe that things that look better will work better, even if they are not more effective or efficient. A positive emotional response from users is elicited by a visual design, making them more tolerant of minor usability issues on the site. According to Sutcliffe (2016), 75% of website credibility judgments are based on the overall design of a website. Although visual design is important when creating a website or mobile app, research shows that the "what is beautiful is usable" concept can only be applied when a product or service's usability issues are minor. Figure 2 displays the inclusive literature review summary for this research study.

Important Features in E-Textbooks Based on Past Research

With the rapid advancement of technology and the norms that force us to adapt to it, users now make no exceptions regarding their digital learning experience. Academic users now expect e-books and digital content to be delivered via an intuitive and mobile platform. According to Gu et al., (2014) and Matraf et al. (2017), usability issues should be fed back into interface design for iterative refinement and improvement, with supporting evidence based on user evaluations. Studies are being conducted to ensure that e-textbooks can be accepted for use in classrooms by students of all ages, including research on specific features that affect their satisfaction with using e-textbooks. Table 1 lists the features investigated in e-textbook/e-book apps.
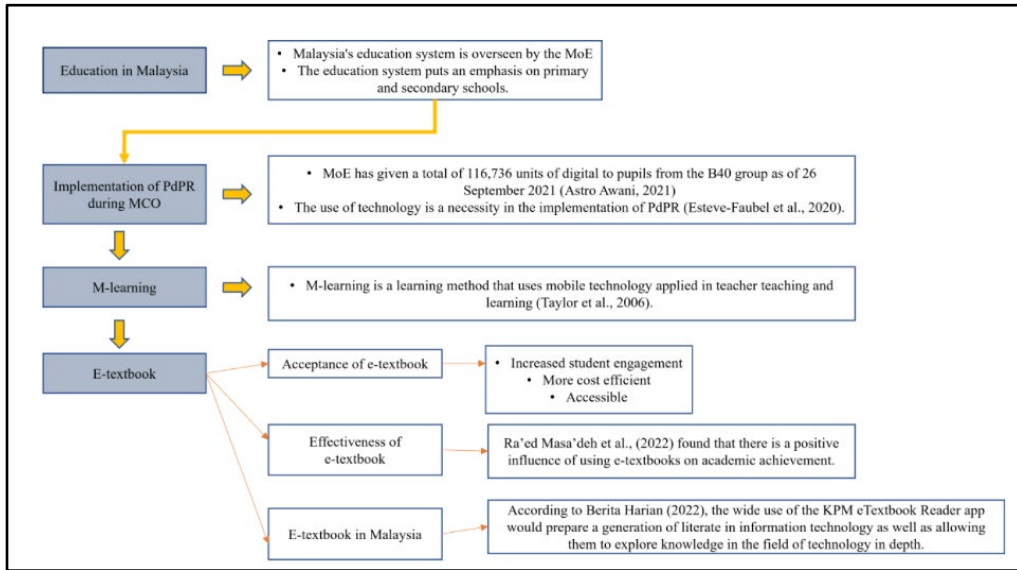
Fig. 2. Inclusive literature review summary for this study

Table 1. List of research recommendations for features that should be put in e-books/e-textbooks for user satisfaction

No.	Features recommended on e-book/e-textbook according to past literature	Sources
1	• Good navigation. • E-book features that can support their reading strategies (printing, downloading of sections, annotations, copying, and pasting of text). • Good coverage and metadata quality of e-books in the catalogs and discovery tools.	Matraf et al. (2017)
2	• Status updates on the e-books, whether the product is in trial or will have a continuous upgrade path. • Cross-platform compatibility • Clear flowing text. • Simple and intuitive content access for users.	Narinasamy et al. (2020)
3	• Provide a user guide and tutorial videos to teach users the basic functions of an e-book. • Provide user cues on how to use search tools. • Distinguish clearly between an image mode, a video mode, and commonly used video player functions, and place such functions in prominent locations for users. • Display an array of navigation menus in a specific area and distinguish this area from other areas for general static presentation and design cohesion.	Kamaruzaman et al (2012)
4	• Include prominent scrolling icons, create simple and easy-to-understand action icons, and create a graphic interface using the affordance property. • To ensure consistent user experience across the web, utilize standard, familiar icons. • Explanatory text that is clear and accessible to accompany icons for which there is no standard. • Rational and apparent decisions about how and where content levels (e.g., book, chapter, page) are displayed and separated.	Huddin et al (2018)

	• Even within chapter-level downloads, consistent page numbering in the book and the PDF file.	
	• Clear and simple search results presentation that reflects user experience across the web.	
5	• An effective e-textbooks must have highlighted and sharing capability, interactivity, web links, or videos.	Dobler (2015)

RESEARCH METHOD

This study is based on evidence and facts gathered from cutting-edge research, interviews, and an examination of the use of teaching and learning via the e-textbook app. This research's main study is to keep the current teaching and learning solution private. However, using the existing app aims to provide secondary school students with the optimal learning environment. Therefore, based on the knowledge approach sought through the issues which mean, knowledge and understanding bring in an interpretive view. There are various categories for rationalising research design. Nevertheless, the principle of the method review used in this research is a critical phase to sustain the consistency of the research structure and approaches. A research design describes how the study will be carried out. According to Blessing et al. (2009), in his design research book, the research design is a plan, structure, and strategy for investigating intended to answer research questions or problems. In any research design study, a research design is necessary to facilitate a smooth research process and provide scholars with the most relevant data possible. Blessing et al. (2009) also emphasized an exigency to recognize the ideal method that drives this study with the research findings. For this reason, the qualitative method was used to carry out this research. This is due to the understanding, exploring, and evaluating the usage of the e-textbook app. A flowchart of the methodological framework is summarised in Figure 3. It can be a technical disadvantage if the sampling domain needs to be carefully designed and structured. According to Oppenheim (2000), a larger sample only sometimes provides a more accurate assessment of population parameters than a smaller sample. This is due to the high sample accuracy rather than the small sample size. As a result, in this context study, the researcher reached out to the Educational Resource & Technology Unit of the Hulu Terengganu District Education Office (PPD) to obtain information on which school utilized the KPM eTextbook Reader mobile app during PdPR. All the schools mentioned were Sekolah Menengah Imtiaz Yayasan Terengganu units, a secondary school registered with the MoE and managed by the Management Division of Imtiaz Yayasan Terengganu. These schools contain eight units in each district of Terengganu. However, the finalized schools are Sekolah Menengah Imtiaz Yayasan Terengganu Kuala Berang, Sekolah Menengah Imtiaz Yayasan Terengganu Kuala Terengganu, Sekolah Menengah Imtiaz Yayasan Terengganu Besut and Sekolah Menengah Imtiaz Yayasan Terengganu Dungun. These four schools were finalised because they were the oldest established Imtiaz units.
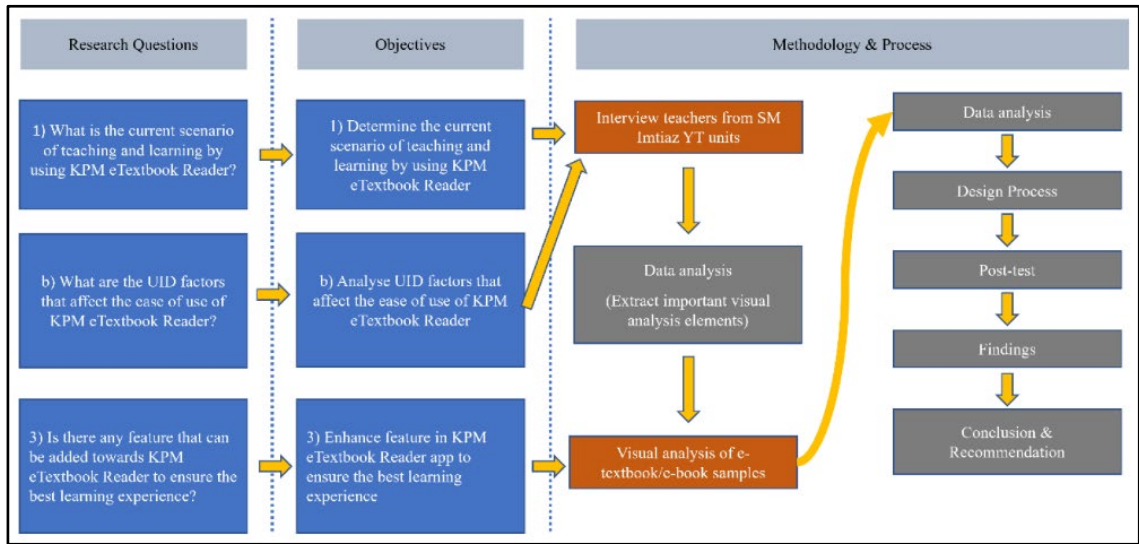
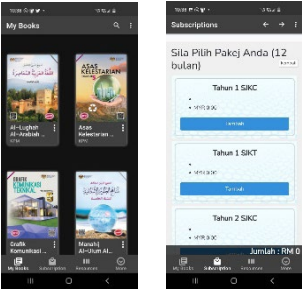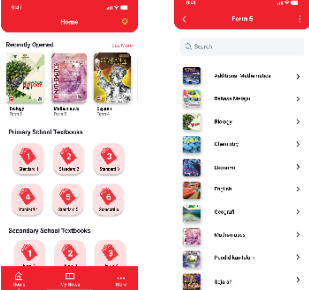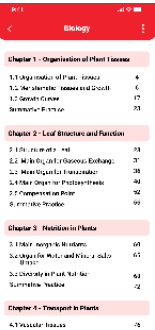Fig. 3. Methodological framework for this study

After these nominations were made, the researchers went through formal procedures of obtaining three approval letters to start the data collection process. Approval letters for data collection from the authorities were also received from MoE. This study also has been approved by the Research Ethics Review Committee, College of Creative Arts Studies, UiTM -CCA/AD/12/2022(MR11). These documents ensured that the researcher executed the data collection process successfully.

Five teachers were involved in the data collection process; they all had more than ten years of experience whom the respective school administration selected for their experience using the KPM eTextbook Reader during MCO for the teaching and learning session. All the interviews were conducted separately at each school in a laboratory setting. The list of questions was given beforehand to ensure the teachers had a clear idea of the interview process. The teachers were also given a smartphone for them to be able to refer to the KPM eTextbook Reader app throughout conducting the interview. Each interview was recorded so the researcher could transcribe accurate information. The session lasted from 20 to 50 minutes, accordingly. This study falls under the category of an exploratory case study due to its 'what' research questions. Exploratory case studies aim to generate relevant hypotheses and suggestions for future research. This is consistent with the researcher's goal: to reconceptualize the user interface of the KPM eTextbook Reader application to ensure the best learning experience for secondary school students in Terengganu. The researchers will conduct exploratory research to gain a deeper understanding of this unidentified concept, demonstrate its existence in significant ways or quantities, and investigate associated challenges.

KPM E-TEXTBOOK READER UID

Based on the data collected from the state-of-the-art and interviews with school teachers, the researchers have proposed a UID for the KPM e-Textbook Reader application. The researcher has contacted all five teachers again for the post-test to get their validation for the final redesign process and received positive feedback and enhancements to work on. The comments include the easier user journey in the book selection process, the colours being more attractive, additional features being helpful for students learning, and the redesign having more seamless navigation. The final product considers all aspects to propose the relevant changes to the KPM eTextbook Reader app. See Table 2 for the optimised interface.

Table 2. KPM eTextbook Reader UID optimisations after data analysis

Screens	UID of KPM eTextbook Reader
Homepage & Subscription	Original interface: Images select books and must be downloaded in bulk. Optimised interface: They are making a list selection instead of an image selection. A text menu allows users to navigate to the content they are interested in quickly. The organisation of books is divided into primary and secondary schools.
Table of Content	Original interface: There are no titles and sub-titles in the table of contents, making teachers guess the pages of specific content. Optimised interface: The menu for chapter selection is listed in full titles and sub-titles.
Annotations	Original interface: Notes have no specific chapter allocations. Optimised interface: Notes are organised into chapters by the e-textbooks.

According to one of the teachers on the latest UID, the order of chapters, titles, and subtitles were essential since they would facilitate locating relevant content. Nevertheless, all teachers believed it was crucial to include multimedia in e-textbooks, especially videos. They consider videos to be one of the most effective forms of media for teaching students. One of the useful features of videos is that students can watch them as often as they want. They sometimes need to remember what we teach in class, and we cannot always be there to assist them, so they can play back the video until they understand the lesson. It is hoped that this study will aid the student in acquiring further knowledge in and out of the classroom.

In overall, the exhaustive and evidence-based nature of this study, along with its practical emphasis on enhancing education through improved UX and UI, makes a compelling case for renewed efforts to transform the landscape of e-textbook applications. It highlights the urgent need for user-centered design in educational technology and provides a solid foundation for future research and development efforts to develop more effective and user-friendly digital learning tools.

FINDINGS

The qualitative analysis of the KPM eTextbook Reader app emphasizes the critical role of User Interface Design (UID) in influencing user experience. The study shows two important criteria that significantly impact the app's effectiveness: book and content organisation. This means that quick navigation across e-textbooks and the availability of a thorough table of contents are critical in increasing user engagement and satisfaction. However, the investigation also reveals several issues concerning UID. These include an incomplete menu, a complicated book selection interface, a lengthy registration process, and a broken website on the Resources Page. These issues will likely cause user irritation and hamper the overall user experience if they are not addressed. As a result, prioritizing user-centered design and constantly developing the app's UI based on user feedback emerges as a must-do strategy.

Interestingly, three teachers' comments reveal a lack of user-friendliness within the software. Their findings highlight important issues about how app developers may ensure students and teachers have a smooth navigation experience. This highlights the iterative nature of app development, where user feedback loops are critical for fine-tuning usability features. Beyond UID, the survey shows additional variables contributing to teacher discontent, including User Experience (UX) difficulties such as frequent crashes, lengthy loading times, and storage limits. This broader viewpoint encourages discussion of the symbiotic relationship between UI and UX in determining user perceptions and overall pleasure.

The study also mentions the app's drawbacks, such as missing content during certain times of the day, making it less ideal for classroom use. Despite these shortcomings, teachers are optimistic about the app's potential to facilitate digitalised learning. This prompts discussions on managing user expectations, the value of consistent improvements, and the difficult balance between immediate usability and future breakthroughs. Surprisingly, the study supports the Technology Acceptance Model (TAM), which holds that user acceptance of technology depends on perceived ease of use and utility. This discovery sparks debate about the TAM model's applicability in various technical contexts and how it might be a guiding framework for developers looking to increase product adoption. In conclusion, the qualitative evaluation of the KPM eTextbook Reader app's UID emphasizes its critical significance in molding the user experience. The study's findings underline the importance of addressing organisational, navigation, and complete content representation issues to increase user satisfaction. However, the broader landscape of UX, together with the app's limitations and future potential, adds subtlety to the discussion, emphasizing the importance of continuing refinement in accordance with user preferences and expectations.

CONCLUSION

In conclusion, this research project represents a concerted effort to redesign the user interface design of the KPM eTextbook Reader application, with the overarching goal of providing an exceptional learning experience to Terengganu secondary school students. According to the qualitative investigation, the issue's

essence lies around the thorough organisation of books and content—singularly the most important indicator of User Interface Design (UID) success within the app. The twin pillars of a superb user experience are (1) quick navigation for locating individual eTextbooks via list browsing and (2) a properly prepared table of contents filled with comprehensive titles and strategically linked subheadings. As a result, any existing e-textbook or e-book programme must rigorously incorporate these features to usher in a realm of perfection for the user.

This study spreads its net further, revealing an assemblage of reasons that cumulatively lead to the teachers' disappointment, as revealed through candid interviews. The user experience (UX) factor is highlighted, with examples of disruptive crashes, lengthy loading times, and insufficient storage facilities. Furthermore, the threat of insufficient e-textbook content during Movement Control Order (MCO) periods emerges, resulting in the application appearing unsuitable for classroom deployment, threatening students' achievement of educational goals. It is telling that, overall, educators have had unfavorable experiences with the software, even as seeds of hope for its untapped potential remain. A palpable sense of impatience pervades the app, waiting for it to transform into the ultimate tool for digitalised learning. In line with Fred Davis' Technology Acceptance Model (TAM), this study emphasizes that true acceptance, based on the foundations of perceived ease of use and usefulness, is a forerunner of an app's success.

This study resonates with MyDIGITAL—a herald of change in the educational sector, trying to turn textbooks and workbooks into an interactive e-book format, a throbbing witness to the country's drive toward digital transformation. As the curtain falls on this scholarly journey, the knowledge discovered herein acts as both a beacon and a lodestar, illuminating the road for future academic investigations into the use of the KPM eTextbook Reader application in the area of pedagogy. The echoes of the e-textbook application's User Interface Design resound in the hallways of understanding that this study has ushered forth, casting it in a greater significance as we set sail toward the digital dawn of textbook evolution.

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CONFLICT OF INTEREST STATEMENT

The authors agree that this research was conducted in the absence of any self-benefits or commercial conflicts and declare the absence of conflicting interests.

AUTHORS' CONTRIBUTIONS

Nurul Nabila conducted the research. Toto Mujio Mukmin conceptualised the central research idea and contributed to the theoretical framework. Muhamad Fairus Kamaruzaman supervised its progress, led the review and revisions, and granted approval for article submission.

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