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College of Computing, Informatics, and Mathematics
Universiti Teknologi MARA Cawangan Melaka, Kampus Jasin
77300, Merlimau, Melaka Bandaraya Bersejarah

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EDITORS

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PREFACE

Welcome to the inaugural volume of the **Progress in Computing and Mathematics Journal (PCMJ)**, a publication proudly presented by the College of Computing, Informatics, and Mathematics at UiTM Cawangan Melaka.

This journal represents a significant step in our commitment to fostering a vibrant research culture, initially providing a crucial platform for our undergraduate students to showcase their intellectual curiosity, dedication to scholarly pursuit, and potential to contribute to the broader academic discourse in the fields of computing and mathematics. However, we envision PCMJ evolving into a beacon for researchers both nationally and internationally. We aspire to cultivate a space where groundbreaking research and innovative ideas converge, fostering collaboration and intellectual exchange among established scholars and emerging talents alike.

The manuscripts featured in this first volume, predominantly authored by our undergraduate students, are a testament to the hard work and dedication of these budding researchers, as well as the guidance and support provided by their faculty mentors. They cover a diverse range of topics, reflecting the breadth and depth of research interests within our college, and set the stage for the high-quality scholarship we aim to attract in future volumes.

As editors, we are honored to have played a role in bringing this journal to fruition. We extend our sincere gratitude to all the authors, reviewers, and members of the editorial board for their invaluable contributions. We also acknowledge the unwavering support of the college administration in making this initiative possible.

We hope that PCMJ will inspire future generations of students and researchers to embrace research and innovation, to push the boundaries of knowledge, and to make their mark on the world of computing and mathematics.

Editors
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e-SIRAH: LEARNING ABOUT SIRAH VIA 2D WEB-BASED APPLICATION

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Abstract

This investigation explores the pedagogical challenges and opportunities in conveying the prophetic biography, or 'Sirah', within the context of Islamic studies. Traditionally, the Sirah constitutes an essential element of both formal and informal religious discourse, transmitted through diverse narratives that maintain the essence of the Prophet's life story across various platforms. This continuity, while preserving the core message, presents difficulties in engaging the modern, technologically adept younger generation within the primary education sector. The conventional didactic methods, often characterized by a "talk and chalk" approach, fail to meet the expectations of these learners, whose anticipations are not aligned with the outdated educational resources currently in use. In response to this educational gap, the project introduces 'e-Sirah': a web application tailored for the Sirah curriculum, developed utilizing the Rapid Application Development methodology. The application's effectiveness was assessed through the System Usability Scale, involving 34 primary education students, yielding a favourable usability rating of 82%. Further evaluation revealed the application's

success in enhancing students' interest in the Sirah, with participants reporting engaging and informative learning experiences. The findings suggest that the 'e-Sirah' web application holds potential for broader application in primary education settings, offering a promising tool for enriching students' understanding of the Prophet's biography.

Keywords: Sirah, Web-Based application, System Usability Scale;

INTRODUCTION

The Sirah's study, focusing on Prophet Muhammad's life and Islamic teachings, faces challenges in Malaysia due to traditional teaching methods that have not fully embraced ICT advancements, thus hindering effective learning (Bozkurt, 2021; Mohd Nawi, 2022; Abdullah & Abdul Razak, 2021). Despite the potential of digital technologies to revolutionize education, Islamic studies often rely on rote memorization and teacher-centered approaches, overlooking the need for critical thinking and practical application of knowledge.

Addressing this issue requires integrating modern teaching strategies and technology to better connect with youth and make Islamic education more engaging (Tabroni et al., 2022; Inglehart, 2017). Proposals for enhancing Islamic education include developing web applications and utilizing digital tools to provide a more interactive learning experience, potentially bridging the gap between traditional teachings and contemporary educational expectations (Lubis et al., 2018; Raja & Nagasubramani, 2018). This approach aims to foster a deeper understanding of Islamic principles among the technologically savvy younger generation, enhancing their educational experience.

LITERATURE REVIEW

The Sirah, chronicling Prophet Muhammad's (PBUH) life, is a cornerstone of Islamic literature, offering spiritual guidance and conveying Islam's peaceful teachings. It

comprehensively covers his life, teachings, and key historical events from 570 to 632 CE, highlighting its significance in Islam's development and spread (Bozkurt, N., 2021; Nasir & Teh, 2021; Umar, 2018). Within Islamic education, particularly in Malaysia, Sirah serves as a crucial educational component, fostering a deep understanding of the Prophet's life and values from an early age. The curriculum provides an in-depth look at his life, teachings, and the pivotal moments of early Islam, emphasizing Sirah's role across educational levels (Azmi, 2019; Zakaria, N., 2019). Textbooks play a vital role in Malaysia's Islamic studies, presenting a detailed and authentic account of the Prophet's life and teachings. Teachers utilize these resources, along with oral traditions and storytelling, to enhance students' learning experience, ensuring a meaningful connection with Sirah's teachings (Hashim, R., 2022).

Contemporary Issues on Learning About Sirah

Traditional teaching methods in Sirah education, relying heavily on physical materials and a "chalk and talk" approach, face challenges in engaging students effectively (Singh, 2021). Digital innovations, however, offer new avenues for educational content delivery, enhancing engagement and learning outcomes (Zhang & Min, 2023; Carsten et al., 2021; Haleem et al., 2022). These technological tools are crucial in overcoming the limitations of conventional classrooms, promoting a more interactive and efficient learning process.

Despite the potential of technology to improve educational quality (Akram et al., 2021; Chen et al., 2018; Danmuchikwali et al., 2020), Islamic education often remains anchored in rote learning, hindering meaningful student engagement and knowledge retention (Ekasari et al., 2019; Ahmed, 2017; Ayoade, 2020; Salsabila et al., 2023). This traditional approach, characterized by its repetitiveness and lack of depth, fails to stimulate student interest and diminishes the effectiveness of learning.

The prevailing perception of Islamic education as tedious and unengaging, coupled with the passive nature of traditional learning environments, underscores the need for innovative educational strategies (Hidayah et al., 2022; Mustaffa & Rashid, 2019; Taratika et al., 2021). There's a critical demand for the development and implementation of captivating teaching

materials that not only deepen understanding of Islamic studies but also rejuvenate student interest, thereby transforming the educational landscape of Sirah (Abdullah M. M., 2019).

Technology Adoption in the Learning of Sirah

Digital applications for primary education, particularly in the study of Sirah using visual and multimedia aids, have received commendable feedback for enhancing the learning experience. Mokhtar (2022) highlighted the positive reception of such multimedia technology in delivering Sirah content, emphasizing the prototype's engaging storytelling and clear design as key factors in its educational success. This underscores the significance of digital tools in improving pedagogical practices and student engagement.

Furthermore, the development of a 2D application, 'Pendidikan Islam SPM Sirrah dan Tamadun (Khulafa' Ar-Rasyidin)', utilizing the Unity platform for SPM students, demonstrated the effectiveness of gamified learning methods. According to Aris & Aziz (2021), this approach significantly enhanced students' educational engagement and understanding. Supported by the findings of Parsazadeha et al. (2018), the application's design and its alignment with educational objectives were praised by educators, indicating its potential to enrich the curriculum and boost academic performance through interactive and user-friendly interfaces.

Learning Model for Sirah Learning and Delivery

Learning models delineate the processes through which individuals assimilate and process information within educational settings, reflecting varied perceptual and cognitive preferences (Syofyan, 2018). The development of a specific application introduces users the Visual, Auditory and Kinesthetic (VAK) learning model. Visual learners, who excel when information is presented through graphical elements such as maps, colors, pictures, and diagrams, benefit from the engagement of sight for observation and reading (Darmin et l., 2021). The application leverages multimedia images and texts to facilitate and enhance the

learning experience for this demographic. Studies have indicated that visual learning not only fosters creativity among students but also bolsters memory retention and aids in the articulation of thoughts and ideas via visual cues (Kędra, 2019). This group is further categorized into visual-linguistic learners, who retain information effectively through written material, and spatial-visual learners, who prefer engaging with visual aids such as multimedia presentations and video demonstrations (Azman, 2021). The application features an interactive component allowing users to explore various landmarks related to Sirah, enriching their learning experience through point-and-click navigation and multimedia integration, thereby promoting interactivity and deepening understanding of the subject matter (C. Matias, 2022).

Conversely, auditory learners acquire knowledge predominantly through listening, favoring oral instruction over written content (Kayalar, 2017). This learning model emphasizes the importance of auditory stimuli, including debates, discussions, and lectures, in the learning process (Ginting, 2017). To accommodate auditory learners, the application incorporates both verbal elements, such as narrations, and non-verbal auditory cues, including background music and sound effects, to enhance comprehension and retention (Rakowski & Loranc, 2019). Additionally, to ensure inclusivity for all auditory learner subtypes, the application integrates narration audio to accompany visual information, thereby catering to individuals who prefer learning through hearing. Research has highlighted auditory learning as a prevalent style among students, suggesting its effectiveness in facilitating the assimilation of knowledge and information (Wulandari et al., 2019). This dual approach within the application aims to accommodate diverse learning preferences, ensuring a comprehensive and accessible educational experience for users engaged in studying Sirah.

Recent investigations into enhancing digital learning for kinesthetic learners have led to the development of innovative engagement strategies. Gorbenko (2021) highlights the difficulties in crafting interactive content for these learners in environments that predominantly benefit visual and auditory learning styles, using the example of physical activities like basketball motions to aid in understanding mathematical concepts. Meanwhile, Christonasis and Kotsis (2023) delve into using tools such as Arduino for active science learning,

demonstrating how hands-on activities can align with educational objectives and significantly improve learning outcomes by immersing students in experiences that stimulate their preference for movement and tactile interaction. This approach underlines the importance of incorporating kinesthetic learning strategies in digital applications to foster more inclusive and effective educational experiences.

METHODOLOGY

The E-Sirah application leverages the Rapid Application Development (RAD) model for its development, aiming for quick, user-responsive creation, balancing speed with the integration of feedback to meet deadlines effectively (Fatimah, 2018). This approach facilitates iterative updates to ensure the app's relevance and efficiency. Usability evaluation uses the System Usability Scale (SUS) by Brook, J. (1996), to quantitatively assess user friendliness through structured questionnaires, informed by educational tool evaluation research (Da Rosa, 2006). This dual methodology, analyzing user experience metrics, provides insights into the app's usability and its potential to improve learning experiences.

RESULT AND DISCUSSION

The e-Sirah application's development focused on addressing the educational needs of its target audience, offering an innovative solution to the limitations of traditional learning resources by providing a digital platform for Sirah education. Its design and functionality were critically evaluated for usability, a key factor in user engagement and satisfaction, essential for the application's success (Omar & Tengku Wook, 2016). The feedback from this evaluation process is vital for refining the application, underscoring the importance of usability in educational technology adoption.

Additionally, the application underwent an evaluation of user interest to gauge engagement levels and its effectiveness in enhancing learning experiences. This aspect of the evaluation aimed to gather insights that could influence the development of future educational

technologies, promoting practices that increase learner motivation and engagement. The use of the System Usability Scale (SUS) as a metric for usability outcomes highlights the application's dual focus on both user satisfaction and educational impact, contributing to the ongoing discourse in educational technology by showcasing the potential of digital tools to support and enhance pedagogical strategies.

The usability score in this study is to be referred to the SUS score from the scale of 0 to 100 in Figure 1. This aims to obtain information about the acceptance rate or usability scale of the developed application i.e e-*Sirah*. The usability score of 81.47 (Table 1) indicates that the acceptability range for this application is highly acceptable. This study reveals that the developed application is accepted by the users and certainly is suitable for use by the intended target population. In addition to this, the adjective rating is indicated to be at the excellent level. Analogous to this, the letter grade scale can also be used instead of the adjective rating, as an alternative way of to easily identify and relate to the absolute meaning of the SUS score. The application receives a B grade scale.

Table 1: SUS Score Result

Question	Score	SUS Score (Score x 2.5)
Q1	**122**	**305**
Q2	**67**	**167.5**
Q3	**148**	**370**
Q4	**104**	**260**
Q5	**139**	**347.5**
Q6	**69**	**172.5**
Q7	**138**	**345**
Q8	**68**	**170**
Q9	**129**	**322.5**
Q10	**124**	**310**

Total	**1108**	**2770**
Total Score, Average (n=34)		**81.47**

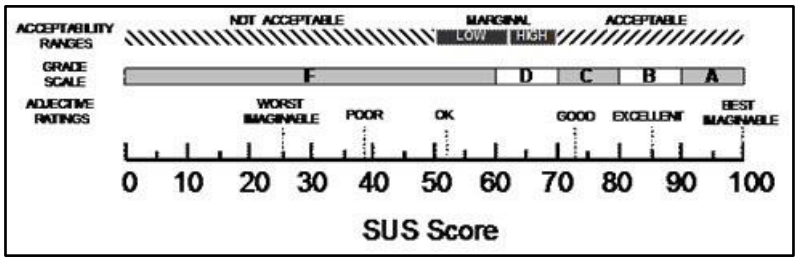

Figure 1 Interpretation of SUS Score Source. Adopted from Bangor et al. (2009)

In addition to assessing the developed application's usability, this research investigates user engagement and interest in employing the application within educational contexts. User feedback on their level of interest was systematically analyzed through descriptive statistical methods, encompassing calculations of mean and standard deviation. Moreover, where relevant, the study also determined frequency and percentage values to gain a comprehensive understanding of user preferences and the application's appeal in facilitating learning activities. This multifaceted analytical approach enables a nuanced evaluation of the application's effectiveness in engaging users, contributing valuable insights into its potential impact on educational practices.

The analysis of user feedback on the e-Sirah application revealed that the highest average score, Mean = 4.21, was attributed to the statement "The simulation is interesting." This was evidenced by 13 (38.2%) respondents expressing agreement and 16 (47%) expressing strong agreement, culminating in an overall approval rate of 85.2%. Such a significant consensus underscores the application's capacity to captivate the respondents' interest.

Literature across various fields posits a connection between interest and other psychological constructs such as motivation, engagement, agency, and motives (Hilppö & Stevens, 2023;

Järvelä & Renninger, 2014). While these interconnected dimensions are recognized, they fall outside the purview of this particular investigation. The focus then shifts to the second highest mean score, which stood at 3.97 for the statement "The simulation helped me to understand the subject.", classified as item number 2. Among the 34 participants, 18 (52.9%) agreed, and 9 (26.4%) strongly agreed with this statement, indicating that the application not only garnered interest but also facilitated a deeper comprehension of the subject matter, with a combined agreement rate of 79.3%.

Regarding user satisfaction with the educational activity, as indicated by item number 8 "My rating for this activity", a notable preference was observed. Specifically, 21 respondents awarded the highest rating of 5 points, and 6 respondents gave a rating of 4 points, aggregating to 27 out of 34 respondents (79.3%) affirming the application's significant appeal and educational value. This data reflects a broad consensus on the application's effectiveness in enhancing learning engagement and understanding among users.

CONCLUSION

The findings from this study underscore the significant potential of the e-Sirah application in enhancing the educational landscape of Sirah learning. With a high SUS scale of 81.47% and a high mean score indicating strong user interest and satisfaction, the application demonstrates its effectiveness as an engaging and pedagogically valuable tool. The overwhelming positive response, with an 85.2% approval rate for its interestingness and a 79.3% agreement on its utility in understanding the subject, attests to the application's ability to resonate with users and facilitate a deeper comprehension of the content. These results align with existing literature, acknowledging the intricate relationship between interest, motivation, and engagement in educational contexts, even as this study remains focused on the application's direct impact. The favorable user ratings further validate the application's appeal and its role in promoting a more interactive and immersive learning experience. Consequently, this research contributes valuable insights into the integration of technology in education, particularly within

the realm of Islamic studies, highlighting the potential for digital tools to enrich traditional learning modalities and foster a more engaging and effective educational environment.

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