THE EVALUATION OF *e-SUKUKATA* BAHASA MELAYU COURSEWARE FOR KINDERGARTEN

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ABSTRACT

The "e-sukukata" e-learning courseware, created for 4-year-old kindergarten students to learn "suku kata terbuka" in Bahasa Melayu, addresses key challenges in early childhood education. These challenges include difficulties in recognizing open syllables, limited vocabulary, and the lack of modern methods for vocabulary acquisition. The project employed the ADDIE model—Analysis, Design, Development, Implementation, and Evaluation—to identify effective teaching and learning requirements. It used an ontology-based technique to design and develop the courseware and conducted thorough evaluations of its functionality and usability. This paper explores the finding on the effectiveness of the courseware. The study involved expert assessments by IT lecturers, as well as formal evaluations by teachers and parents, demonstrating the courseware's effectiveness in enhancing the learning experience. The results showed high levels of user satisfaction, ease of use, and educational impact, indicating that "e-sukukata" courseware is a valuable tool for early language development. This research underscores the importance of incorporating interactive multimedia and modern educational methods to support linguistic development in young students, making a significant contribution to early childhood education.

Keywords: courseware, kindergarten, usefulness, ease of use, ease of learning, satisfaction.

Introduction

The *e-Sukukata* courseware work was initiated to address the challenges students face in understanding *sukukata terbuka* in Bahasa Melayu. The curriculum is designed to tackle developmental issues such as difficulties with pronunciation and slow vocabulary acquisition. By consulting with educators from Tabika Kemas Al-Ikhlas, Tabika Kemas Sri Nakhoda, and Tadika Naluri Kreatif Wakaf Beruas, the work identified specific needs and developed tailored solutions. The courseware integrates knowledge management principles, systems thinking, and ontology-based techniques. To engage students effectively, the courseware features modules on vowel networking, thematic word categories, and interactive quizzes. This comprehensive approach not only addresses educational gaps but also enhances learning through engaging multimedia content, which aids in retention and comprehension.

The work focusses on enhancing language skills and cultural relevance by deeply embedding concepts of Bahasa Melayu and *suku kata terbuka*. The e-Sukukata courseware aims to transform traditional teaching methods into dynamic, interactive learning experiences tailored to the needs of four-year-old students. During its research and implementation phases, this work encountered various challenges despite its innovative design and positive outcomes. The initial complexity of the design required iterative adjustments to enhance multimedia integration and pedagogical effectiveness (Khedif, Engkamat, & Jack, 2014; Durdu, Yalabik, & Cagiltay, 2009). Technical constraints, such as issues with internet accessibility and device compatibility, complicated efforts to ensure a smooth user experience across different learning environments (Vladoiu, 2011). Additionally, ongoing improvements based on user feedback and evolving instructional strategies were necessary to maintain engagement and educational effectiveness (Su et al., 2024; William, Graves, & Bernas, 2001).

These challenges underscore the iterative nature of developing instructional technology and highlight areas for future improvement. To effectively integrate adaptive learning technologies, expand content modules, and enhance user interface design, further research and development are required. By addressing these issues, e-sukukata aims to sustain its impact and relevance in early childhood language education, supporting lifelong learning and educational growth.

The e-Sukukata Courseware

This section discusses the capability of the courseware in providing features that can help students in learning open syllables. The e-Sukukata courseware incorporates interactive multimedia elements—such as vibrant graphics, engaging games, and audio features—to create an adaptable and dynamic learning environment. This courseware is designed with an intuitive interface to encourage exploration and interaction, catering to various learning styles while meeting curriculum standards.

In fostering interest among kindergarten children, the courseware's homepage is visually appealing, featuring a colorful design with a friendly cat and robot, which guides students to either learning modules or educational games. The modul divided into two which are: The *Pembelajaran* and *Permainan*. The *Pembelajaran* section offers structured lessons on vowels, *suku kata terbuka*, and relevant vocabulary, breaking down complex language concepts into accessible segments. Each section includes clear navigation buttons to ensure a user-friendly experience. The subsection of *Pembelajaran* is the *Mari Mengenal Huruf Vokal* page, focuses on teaching vowel letters (A, E, I, O, U) through interactive content and quizzes. This page helps students understand how vowels are integral to mastering *suku kata terbuka*. Also, the subsection the *Mari Mengenal Suku Kata Terbuka* page provides a tutorial on open syllables, using videos and examples to explain syllable structures.

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The *Perkataan Suku Kata Terbuka* page explores words made up of *suku kata terbuka*, offering sections on two-syllable and three-syllable words, accompanied by quizzes to reinforce learning. Additionally, the *Permainan* page features three instructional games— *Teka Perkataan, Susun Suku Kata Terbuka,* and *Padankan Suku Kata Terbuka*—which make learning engaging by allowing students to practice and reinforce their language skills in a fun, interactive manner. These games support vocabulary building, word structure understanding, and syllable matching, enhancing the overall educational experience.

For that, e-Sukukata courseware aims to provide a comprehensive, engaging learning tool for young students, promoting effective language acquisition through interactive and adaptive methods. In Figure 1 depicted the e-Sukukata courseware pages.
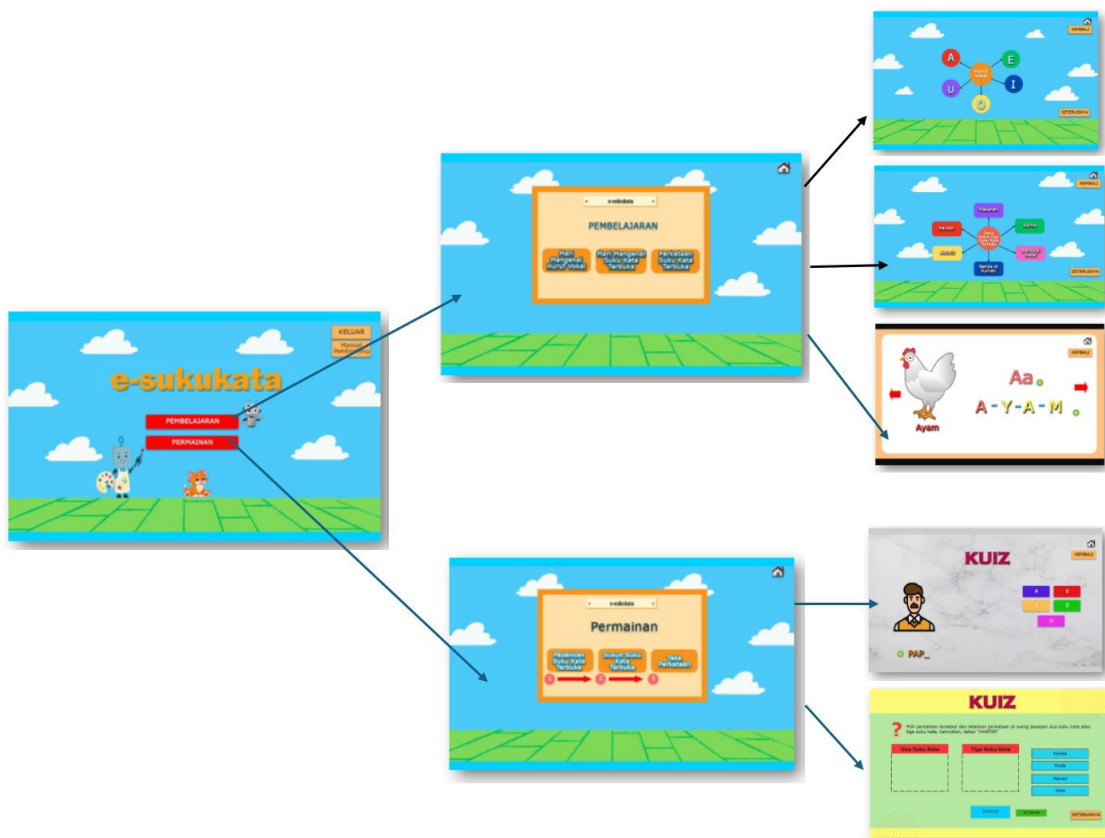

Figure 1 The e-Sukukata Pages

Result and Discussion

i)   Evaluation on Theories Applied

Developed as an interactive e-learning tool, e-Sukukata courseware features vibrant graphics, engaging games, and audio elements to create an immersive learning environment. This courseware focuses on making language learning both effective and enjoyable by incorporating age-appropriate content and visually appealing designs. This section reviews the outcomes and insights gained from the development and implementation phases, highlighting their importance for early childhood education.

During the courseware development process, several enhancements were identified to optimize user engagement and educational outcomes. To create an immersive learning experience that captivates students, it is essential to integrate interactive games and vibrant visuals (Zellner, 2011). A well-designed feedback mechanism was implemented to gather data and adjust content based on user interactions, ensuring continuous improvement and alignment with learning objectives. Additionally, a thorough assessment strategy was utilized to evaluate the effectiveness of the curriculum in fostering language proficiency and literacy development among kindergarten students. The implementation of e-Sukukata courseware significantly transformed the way four-year-old kindergarten students learned *suku kata terbuka* in Bahasa Melayu. In Table 1 below highlights the differences in the learning process before and after the introduction of e-Sukukata courseware.

Table 1 The differences in the learning process after the introduction of e-sukukata courseware

Process Stage	Before e-sukukata (Current Practice)	After e-sukukata
Content Delivery	dependence on conventional phonics-based instruction.	Combining interactive multimedia components (games, audio, and images)
Engagement	minimal interaction with static course materials.	Increased interaction with lively graphics and interactive games.
Feedback Mechanisms	informal, mostly verbal feedback collection.	Courseware with structured feedback loops integrated for ongoing development.
Customizati on	uniform instruction with little room for modification.	customized educational opportunities based on each student's development
Evaluation	regular evaluations with little in the way of immediate feedback.	ongoing assessment coupled with quick response systems.

This section will present findings from the evaluation conducted, focusing on the theories applied within this courseware, namely: ontology-based techniques, knowledge management, and systems thinking. Below are the findings from the evaluation that has been carried out.

a) *Ontology-based Technique*

The vowel networking system exemplifies the ontology-based technique utilized in the e-sukukata courseware. When a user clicks on a vowel, examples of words featuring *suku kata terbuka* with that vowel are displayed. This system also organizes *suku kata terbuka* into themes, such as activity themes. Clicking on an activity theme reveals related activities to *suku kata terbuka*. This structured approach helps children make connections between different linguistic elements. In the following figure (as in Figure 2) shows the ontology-based technique that applied in the courseware.
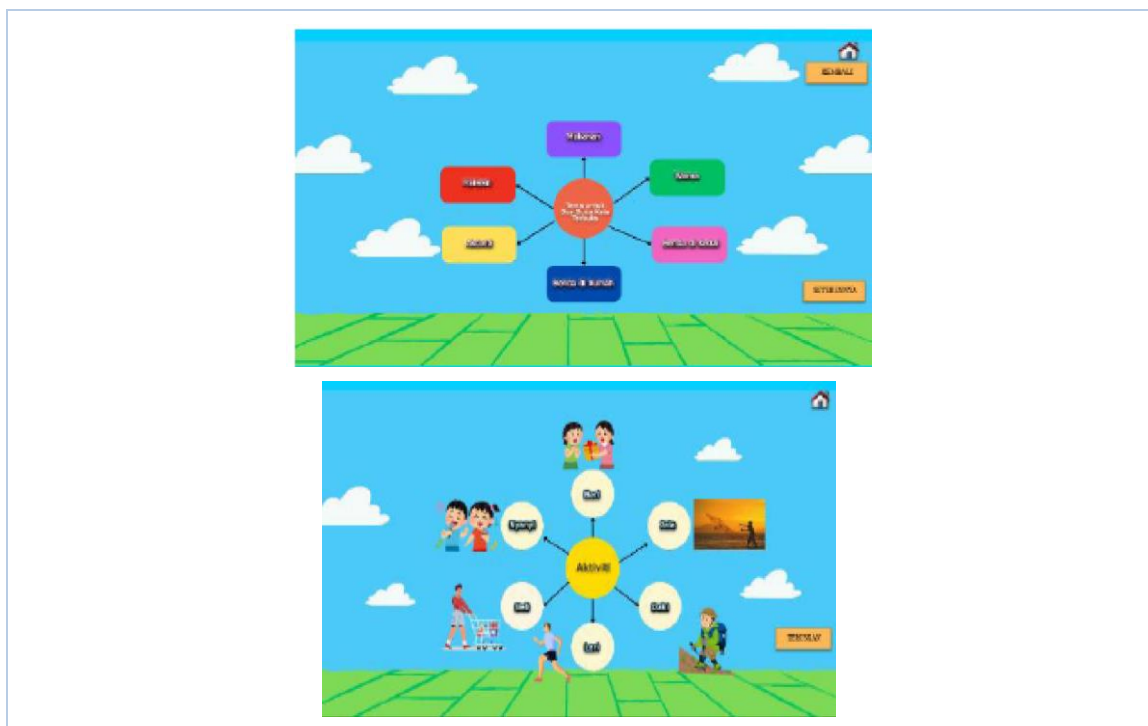

Figure 2 The application of Ontology-based Technique in the courseware

It is found that, the e-Sukukata courseware employs an ontology-based technique through its vowel networking system, enabling students to click on a vowel and view examples of words that include that vowel. This technique helps children understand how words are interconnected by shared vowel sounds and organizes these connections into themes. By visually linking vowels to related words and examples, children gain a clearer understanding of and better retention of the relationships between these linguistic components.

b) *Knowledge Management*

The training materials feature numerous examples of *suku kata terbuka* and include video lectures on *Mari Mengenal Suku Kata Terbuka*. This extensive array of resources systematically enhances students'

understanding of *suku kata terbuka* and improves their knowledge management. The information is organized in a structured way to ensure that students can easily access and retain it, thereby enhancing both comprehension and memory. In Figure 3 shows the knowledge management technique that applied in the courseware.

Figure 3 The application of Knowledge Management Technique in the courseware

The courseware employs a range of examples and video lectures to systematically teach *suku kata terbuka*. By organizing the information effectively, it is found that it allows students to access and retain knowledge more efficiently. This structured method enhances their understanding and memory of *suku kata terbuka,* enabling them to build on their learning progressively.

c) System Thinking Technique

The tasks and quizzes in the courseware effectively illustrate the system thinking technique. These activities encourage children to engage in critical thinking and problem-solving. By participating in these interactive projects, students enhance their cognitive skills and apply their learning to real-world scenarios, thereby reinforcing their understanding of *suku kata terbuka* in an enjoyable manner. In the following figure (Figure 4) shows the system thinking technique that applied in the courseware.

Figure 4 The application of System Thinking Technique in the courseware

The courseware features quizzes and games designed to foster system thinking. It is found that, these activities encourage children to think critically, solve problems, and apply their knowledge of *suku kata terbuka* in practical contexts. Through these interactive exercises, children not only enhance their cognitive skills but also reinforce their learning in an engaging and meaningful way.

ii) User Evaluation

Next, this section will discuss the findings from the evaluation conducted on the users. A diverse group of thirty individuals, including parents, teachers, and students, participated in the user evaluation of the e-Sukukata courseware. This mixed group was selected to offer a broad range of feedback on the courseware's effectiveness and usability. The participants varied widely in age: 10% were aged 18–20 years, 36.7% were 21–24 years, and 53.3% were 25 years and older. The group included 40% males and 60% females. Educational backgrounds varied, with 10% holding a diploma, 30% a degree, and 40% being parents, while 10% were instructors. Additionally, 60% of the participants had previous experience with online interactive learning systems, whereas 40% did not. This diverse demographic provided a comprehensive and representative evaluation of the courseware from different user perspectives. The demographic information of the respondents is summarized in table (Table 2) below.

Table 2 Respondents' Demographic

Respondent Demography		Total Participant	Percentage (%)
Gender	Male	12	40
	Female	18	60
Age	18 – 20	3	10
	21 - 24	11	36.7
	25 and above	16	53.3
Participant Classification	Diploma	3	10
	Degree	9	30
	Postgraduate	3	10
	Parents	12	40
	Teacher	3	10
Use on online interactive learning platforms	Yes	18	60
	No	12	40

In analyzing the user assessment, statistical metrics such as mean, mode, and standard deviation were employed. The mean, or average score, indicates the overall trend for each question, providing a general sense of user feedback. The mode represents the most frequently occurring score, highlighting common responses among participants. Standard deviation measures the variability or dispersion of the scores, illustrating how much the responses deviate from the mean. Together, these metrics offer a comprehensive understanding of user satisfaction and identify areas where the courseware may need

improvement. Four key features were assessed for users: usefulness, ease of use, ease of learning, and user satisfaction. Below are the results from the evaluation.

a)   Result of Usefulness

In Table 3 shows the result of usefulness. Respondents evaluating the effectiveness of the e-Sukukata courseware provided valuable feedback on its support for 4-year-old students learning *sukukata terbuka*. The courseware received a high mean score of 4.2, indicating that users generally found it effective. The mode of 4 reflects that most participants rated the courseware's usefulness positively. The standard deviation of 0.571 shows low variability in responses, suggesting that user experiences were largely consistent. Feedback highlighted that the courseware effectively supported specific learning objectives and was well-suited for young students. The variety of activities was noted as a crucial factor in sustaining student engagement, significantly enhancing the educational impact of the courseware.

Table 3 Result of Usefulness

No.	Descriptions	Mean	Mod	Standard Deviation
1	The activities in the e-sukukata courseware help 4- years-old kindergarten students learn *suku kata terbuka* effectively.	4.00	5	0.52
2	The feedback provided by the courseware helps improve student's understanding of *suku kata terbuka*.	4.20	4	0.63
3	The courseware supports the specific learning objectives for teaching *suku kata terbuka* in *Bahasa Melayu*.	4.13	4	0.66
4	The content of the e-sukukata courseware is suitable for teaching *suku kata terbuka* to 4-years-old kindergarten students.	4.33	5	0.71
5	The courseware provides a variety of activities that keep students engaged in learning *suku kata terbuka*.	4.27	5	0.75

b)   Result of Ease of Use

The ease-of-use criterion received a mean score of 4.23, reflecting very positive feedback on its navigational elements and user interface. The mode of 4 confirms that the most common reaction was favorable, aligning with the overall mean score. Despite some variability, indicated by a standard deviation of 0.588, users generally found the courseware to be user-friendly and intuitive. Key praises included the accessibility of the main menu, the readability and clarity of text and labels, and the absence of technical issues. The courseware's responsiveness to user input was also highlighted, contributing to a smooth and efficient user experience. These findings suggest that the courseware effectively meets usability standards, making it a reliable tool for teaching both educators and young learners. The result is shown in Table 4.

Table 4 Result of Ease of Use

No.	Descriptions	Mean	Mod	Standard Deviation
1	The user interface of the e-sukukata courseware is easy for students to navigate.	4.33	5	0.33
2	It is easy to access the main menu or home page from any part of the courseware.	4.33	5	0.33
3	The text and labels on the user interface are clear and understandable for students.	4.33	4	0.32
4	The courseware is free from technical issues and bugs.	4.33	4	0.46
5	The courseware responds quickly tointeractions from students.	4.33	4	0.44

c)   Result of Ease of Learning

As shown in Table 5, the ease of learning criterion achieved a mean score of 4.2, indicating that the materials are well-suited for quick and self-directed learning by students. The most frequent score was 4, suggesting consistently positive feedback. The standard deviation of 0.588 shows minimal variation in user experience, reinforcing the overall consistency of responses. Users appreciated the straightforward and easy-to-follow activity instructions, which are particularly beneficial for the target age group. The courseware's user-friendly layout supports self-paced learning, allowing students to explore and engage with the content independently. The exercises were noted for being both entertaining and educational, facilitating effective and enjoyable learning of *sukukata terbuka*. Overall, the courseware's design promotes individual learning, making it a valuable resource for early childhood education.

Table 5 The Result of Ease of Learning

No.	Descriptions	Mean	Mod	Standard Deviation
1	The instructions for the activities are simple and easy for students to follow.	4.20	45	0.36
2	Students can quickly learn how to use the e-sukukata courseware to study *suku kata terbuka.*	4.27	4	0.48
3	The courseware is intuitive and does not require much adult guidance for students to use.	4.07	4	0.53
4	The activities are designed in a way that students find engaging and educational for *suku kata terbuka.*	4.20	4	0.28
5	The courseware supports self-paced learning for students studying *suku kata terbuka.*	4.27	4	0.50

d)   Result of User Satisfaction

For user satisfaction, the courseware received a mean satisfaction score of 4.1, reflecting a high level of overall user contentment. Refer to Table 6, the mode of 4 further emphasizes the generally positive feedback. Although the standard deviation of 0.607 is slightly higher than in other areas, it still indicates

a fairly consistent user experience. Users appreciated the courseware's ability to keep students engaged with learning *sukukata terbuka*, with particular praise for the audio, video, and animation elements that enhanced the learning experience. The courseware effectively met user expectations, and many respondents indicated they would recommend it to other parents, educators, and teachers. This positive feedback underscores the courseware's potential for wider use in early childhood education, affirming its effectiveness and value as a teaching resource.

Table 6 The Result of User Satisfaction

No.	Descriptions	Mean	Mod	Standard Deviation
1	I am satisfied with the overall experience of the e-sukukata courseware.	4.03	4	0.40
2	The e-sukukata courseware keeps students engaged and interested in learning *suku kata terbuka*.	4.13	4	0.55
3	The multimedia elements (audio, video, animation) in the courseware enhance student's learning of *suku kata terbuka*.	4.17	4	0.54
4	The courseware meets my expectations as an educational tool for teaching *suku kata terbuka*.	4.03	4	0.40
5	I would recommend the e-sukukata courseware to other parents, teachers, or educators.	4.07	4	0.37

iii)   Discussion

In Table 7 is the summarization of the elements that are evaluated, The user evaluation of the e-Sukukata courseware reveals overall positive feedback across several key areas. The Usefulness received a mean score of 4.2 and a mode of 4, indicating that respondents felt the activities effectively supported learning *sukukata terbuka*. This confirms the courseware's educational value and its alignment with teaching objectives. Ease of Use scored a mean of 4.23, suggesting that the user interface and navigation are generally intuitive and accessible. For Ease of Learning, the mean score of 4.2 reflects users' appreciation for the clear design and minimal need for adult assistance. The User Satisfaction had a mean score of 4.1, highlighting overall positive opinions about the courseware's effectiveness and user experience. These results underscore how e-Sukukata effectively engages four-year-olds, enhances their understanding of *sukukata terbuka* in Bahasa Melayu, and supports their educational journey in a user-friendly manner.

Table 7 Summary of the results

Criterion	Mean	Mod	Standard Deviation
Usefulness	4.03	4	0.40
Ease of Use	4.13	4	0.55
Ease of Learning	4.17	4	0.54
User Satisfaction	4.03	4	0.40

Therefore, it can conclude that, to revolutionize early childhood education, this courseware has created interactive online course materials tailored for four-year-old kindergarten students learning *sukukata terbuka* in Bahasa Melayu. Recognizing the importance of building linguistic foundations at this developmental stage, the courseware employs ontology-based strategies to organize content and enhance learning outcomes. The e-Sukukata courseware provides an engaging platform with vibrant visuals, interactive exercises, and intuitive navigation, allowing students to explore the intricacies of *sukukata terbuka*.

Conclusion

In conclusion, the development and evaluation of e-Sukukata courseware represents a significant advancement in early childhood education, particularly for Bahasa Melayu-speaking children. The courseware's integration of interactive multimedia and ontology-based methodologies has notably enhanced the learning outcomes for four-year-olds studying *sukukata terbuka*. Users feedback have highlighted its high usability, engaging features, and positive educational impact, confirming its effectiveness in meeting educational objectives. Collaboration among teachers, parents, and other stakeholders has been instrumental in refining this courseware to align with educational standards and pedagogical practices. Moving forward, e-Sukukata courseware will be continuously improved based on evaluation insights, further solidifying its role as a vital tool for early childhood language development and education.

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