e-ISBN : 978-629-98755-2-9

SIG : e-Learning@CS
https://appspenang.uitm.edu.my/sigcs/
Publication Date : 18 – Sep - 2024

THE *e-SUKUKATA TERBUKA BAHASA MELAYU* COURSEWARE DESIGN USING ONTOLOGY-BASED TECHNIQUE FOR KINDERGARTEN

Nur Hidayah binti Nordin[1], *Rozita binti Kadar[2] and Syarifah Adilah Binti Mohamed Yusoff[3]
*2021898708@student.uitm.edu.my[1], *rozita231@uitm.edu.my[2], syarifah.adilah@uitm.edu.my[3]*

[1]College of Computing, Informatics and Mathematics
Universiti Teknologi MARA, Terengganu Branch, Terengganu, Malaysia

[2,3]Department of Computer and Mathematical Sciences
Universiti Teknologi MARA, Pulau Pinang Branch, Pulau Pinang, Malaysia

**Corresponding author*

ABSTRACT

E-learning technology has transformed education by creating engaging, dynamic learning environments that greatly enhance learning outcomes. Teachers now have the ability to facilitate self-paced learning, offer timely feedback, and customize course materials to individual needs. Central to this shift is interactive courseware, which combines structured content, multimedia elements, and assessments, significantly boosting student performance. The development of this courseware involves integrating effective learning techniques such as system thinking, knowledge management, and ontology techniques. Effective knowledge management is vital in kindergarten education, aiding in the organization and dissemination of learning materials. Incorporating system thinking into e-learning design further enhances critical thinking and problem-solving skills. The Ontology-based Technique utilizes semantic frameworks to tailor content to students' specific needs, personalizing learning and improving outcomes. When teaching Bahasa Melayu to kindergarten students, multimedia-rich e-learning courseware—featuring videos, games, and audio—provides an engaging, adaptable learning experience. This approach supports personalized learning and offers immediate feedback, which is particularly beneficial in remote or underserved areas. Consequently, this research focuses on designing interactive, multimedia-enhanced e-learning courseware for 4-year-old kindergarten students, integrating knowledge management, system thinking, and ontology to enrich their educational experience.

Keywords: Courseware, Ontology Technique, Knowledge Management, System Thinking, Kindergarten

Introduction

The advent of e-learning technology has brought about a profound transformation in education delivery, providing adaptable and immersive learning environments that greatly enhance educational outcomes. Teachers can elevate student learning by facilitating self-paced learning, offering timely feedback, and customizing education through course materials. Interactive course materials play a crucial role in fostering efficient and effective learning, delivering structured content, multimedia components, assessments, and interactive functionalities. Research conducted by Agno & Ponte (2013) corroborates the positive influence of interactive course materials on student achievements.

In the context of teaching *Bahasa Melayu* to preschoolers, e-learning multimedia course materials offer a promising avenue for enhancing learning results. By incorporating interactive elements like videos, games, and audio segments, e-learning course materials can captivate the attention of young learners and make the learning process more engaging. This multimedia approach provides a dynamic and interactive learning environment that caters to the diverse learning preferences and styles of preschoolers. Additionally, e-learning course materials allow students to learn at their own pace, facilitating personalized learning experiences tailored to individual needs and abilities. Through interactive exercises and activities, students actively participate in their learning, reinforcing language skills in an enjoyable and interactive manner. Moreover, e-learning course materials can provide instant feedback, enabling students to monitor their progress and promptly address areas needing improvement. The utilization of the Ontology-based technique represents a potent strategy for enhancing learning outcomes in e-learning multimedia course materials. By employing an ontology-based semantic framework to organize course content, students can access pertinent information and resources suited to their unique needs and learning styles. Rahayu et al. (2022) underscores the pivotal role of ontologies in adaptive learning technology, highlighting how the implementation of this technique can personalize the learning journey and optimize outcomes for students.

Consequently, the primary focus of this research revolves around designing interactive course materials tailored for preschool-aged students, particularly those in the 4-year-old age group. This endeavor integrates various techniques, including multimedia elements, knowledge management, systems thinking, and ontology, with the aim of enriching the learning experience for young learners. The overarching objective is to facilitate the enhancement of students' learning abilities by comprehensively integrating these techniques.

In pursuit of this goal, the paper suggests a design phase for interactive course materials aimed at facilitating the learning of *Bahasa Melayu* among 4-year-old students, focusing particularly on *sukukata terbuka*. The study delineates the specific objectives as follows:

i. Develop a blueprint for the eLearning courseware.
ii. Design engaging and appropriate multimedia elements.
iii. Create a user-friendly interface for easy navigation.

The subsequent section will present the design framework employed. Finally, the paper will conclude with a summary of the study.

Courseware Design.

This project will explore *sukukata terbuka*, knowledge management, and the system thinking technique as integral components of e-learning courseware designed for 4-year-old students. *Sukukata terbuka* in *Bahasa Melayu* refers to syllables ending with a vowel sound without a subsequent consonant, where the vowel sound is distinctly pronounced, enhancing the language's rhythmic flow. Ahmad and WA's (2012) study identified *sukukata terbuka* using instrumental phonetic analysis.

Within the project's scope, participants include teachers, 4-year-old students, *Bahasa Melayu*, and the concept of *sukukata terbuka*. Teachers play a crucial role in implementing effective instructional strategies, customizing content to address developmental needs and promote engagement. *Bahasa Melayu* provides a cultural and linguistic backdrop, emphasizing language acquisition, while *sukukata terbuka* serves as a focal point for linguistic exploration within this framework.

This paper centers on designing an e-content package using the widely adopted ADDIE instructional model, which first emerged in 1975 (Branson, 1975). The e-content package is intended for individual learning purposes. Transitioning to the design phase, the focus lies in crafting a blueprint for the e-learning courseware. Considering the young learners' age, the design must integrate lively colors, captivating animations, and intuitive navigation to ensure a pleasant and productive learning journey. Breaking down the content into manageable, easily digestible segments is essential, taking into account the limited attention span typical of 4-year-olds. The works on this phase are: Brainstorm and sketch the course structure and content flow, Design colourful and visually appealing animations and Create wireframes for the e-learning platform.

i. Site Map

The site map for the project will strategically outline the navigation flow, content structure, and interactive elements, providing a clear roadmap for both developers and users. Figure 1 shows the sitemap of *e-sukukata* courseware.

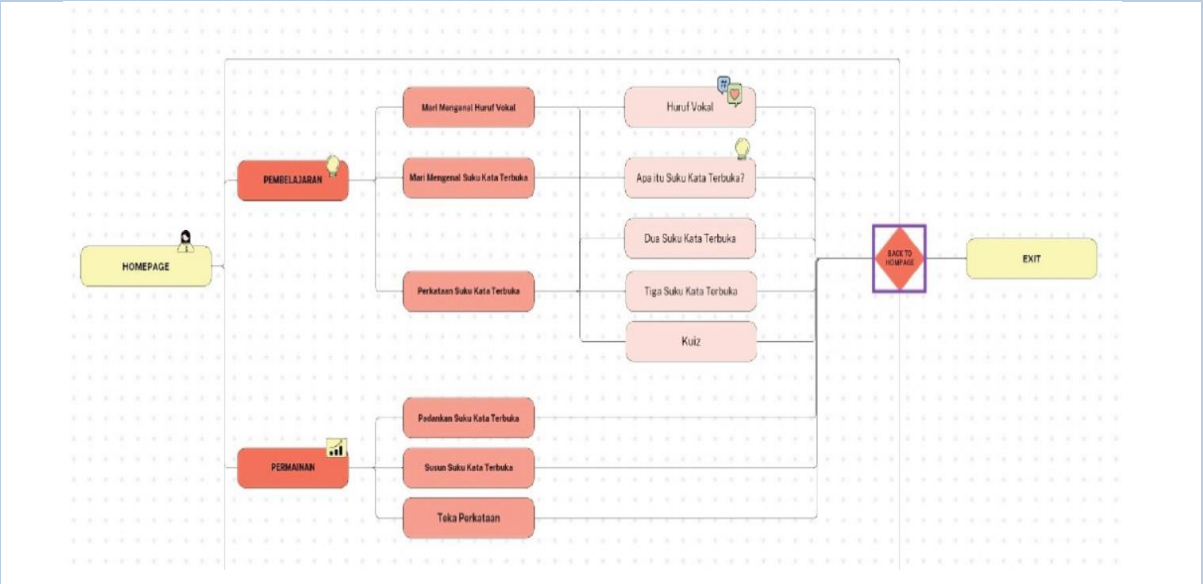

Figure 1 Sitemap of *e-Sukukata* Courseware

ii. Navigation Map

This stage involves crafting an intuitive navigation system that guides learners through the courseware effortlessly. Clear menus, icons, and interactive elements will be implemented to enhance user engagement and facilitate easy exploration of the educational content. In Table 1 shows the description of the navigation map.

Table 1 Description of the Sitemap

Screen Number	Screen Discription
1.0	Homepage
2.0	Pembelajaran
3.0	Mari Mengenal Huruf Vokal
3.1	Huruf Vokal
3.2	Kuiz
4.0	Mari Mengenal Suku Kata Terbuka
4.1	Apa Itu Suku Kata Terbuka?
5.0	Perkataan Suku Kata Terbuka
5.1	Dua Suku Kata Terbuka
5.2	Tiga Suku Kata Terbuka
5.3	Kuiz
6.0	Permainan
6.1	Padankan Suku Kata Terbuka
6.2	Susun Suku Kata Terbuka
6.3	Teka Perkataan
7.0	Back To Home
8.0	Exit

iii. Storyboard

The storyboard for this project will focus on presenting *sukukata terbuka* concepts in a captivating and age-appropriate manner, ensuring a cohesive and engaging learning journey for the young students. The details description each on storyboard is shown in Table 2 and in Figure 2 shows the storyboard of *e-sukukata.*

Table 2 Details Description on Storyboard

No. of Storyboard	Description
1	The "e-sukukata" courseware, designed for 4 years-old kindergarten students studying suku kata terbuka in bahasa melayu, features a captivating homepage adorned with vibrant colours such as blue, yellow, green, white, and red. The presence of a friendly robot and a cute kitten, along with a serene cloud, creates an inviting environment for young learners. Upon entering the homepage, users encounter two prominent buttons – "Pembelajaran" for learning materials and "Permainan" for exercises. These buttons, strategically designed to attract the attention of kindergarten students, provide a visually engaging interface.
2	Clicking on the "Pembelajaran" button leads to a set of three further options: "Mari Mengenal Huruf Vokal," "Mari Mengenal Suku Kata Terbuka," and "Perkataaan Suku Kata Terbuka". The structured progression ensures a seamless learning experience.
3	Choosing "Mari Mengenal Huruf Vokal" reveals two additional buttons: "Huruf Vokal" and "Kuiz."
4	Exploring "Huruf Vokal" allows users to view the five vocal letters - A, E, I, O, U
5	Further interaction involves tracing the selected alphabet, fostering letter recognition skills.
6	The "Kuiz" option within "Mari Mengenal Huruf Vokal" introduces an interactive quiz element, enhancing the engagement and assessment aspects of the learning process.
7	"Mari Mengenal Suku Kata Terbuka" unfolds a section dedicated to notes on Suku Kata Terbuka.
8	Followed by examples categorized based on vocal alphabets. This approach provides a structured understanding of Suku Kata Terbuka.
9	Exploring "Perkataan Suku Kata Terbuka" within "Pembelajaran" introduces subtopics like "Dua Suku Kata Terbuka," "Tiga Suku Kata Terbuka," and a "Kuiz" button
10	Each subtopic further delves into themes like "Haiwan," "Makanan," "Warna," "Aktiviti," "Benda di Rumah," and "Benda di Sekolah."
11	For the "Dua Suku Kata Terbuka" theme, users encounter categories such as "Haiwan," where examples of Dua Suku Kata Terbuka related to animals are presented, fostering thematic and linguistic connections.
12	Switching to the "Permainan" section on the homepage, users discover three interactive games – "Padankan Suku Kata Terbuka," "Susun Suku Kata Terbuka," and "Teka Perkataaan." These games inject an element of fun and reinforce the learned concepts.
13	The final page presents a simple yet crucial query – "Do you want to exit?" Users can choose between "Yes" and "No" buttons, allowing for a seamless and user-friendly exit experience from the courseware.

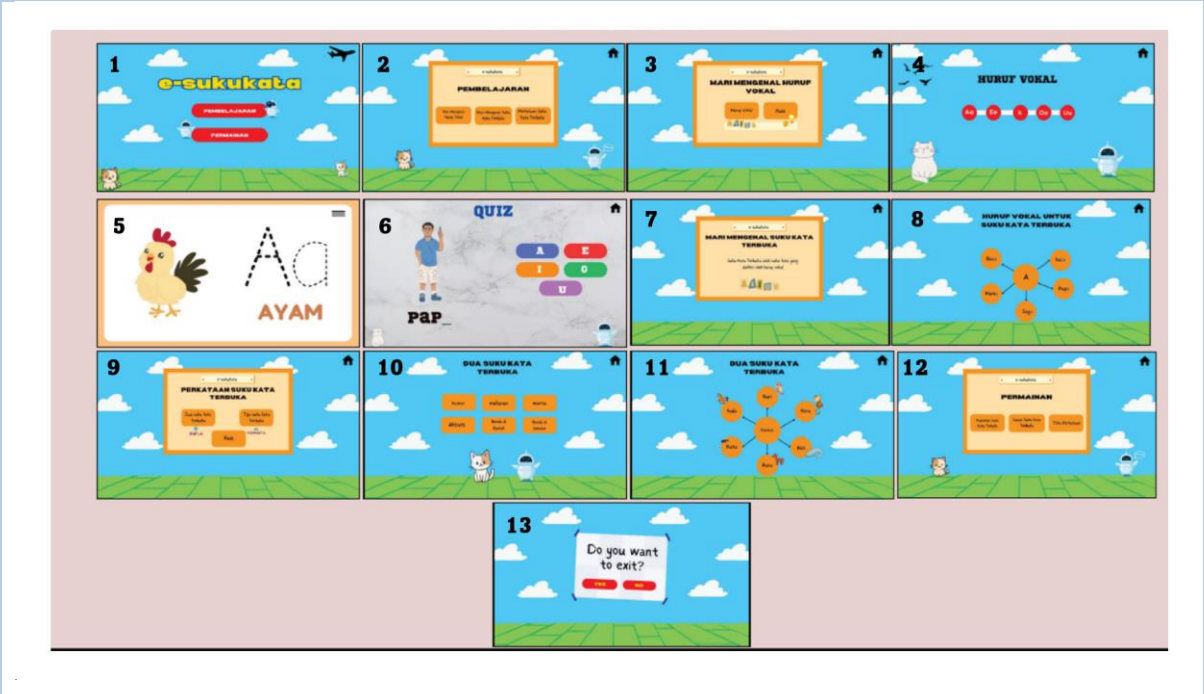

Figure 2 Storyboard of e-Sukukata Courseware

iv. Wireframe

Wireframing serves as the blueprint for the e-learning courseware's visual interface. This phase involves outlining the layout, placement of elements, and overall design aesthetics. The wireframes for this project will be meticulously crafted to strike a balance between visual appeal and educational effectiveness, providing a foundation for the subsequent development stages. Figure 3 shows the wireframe.

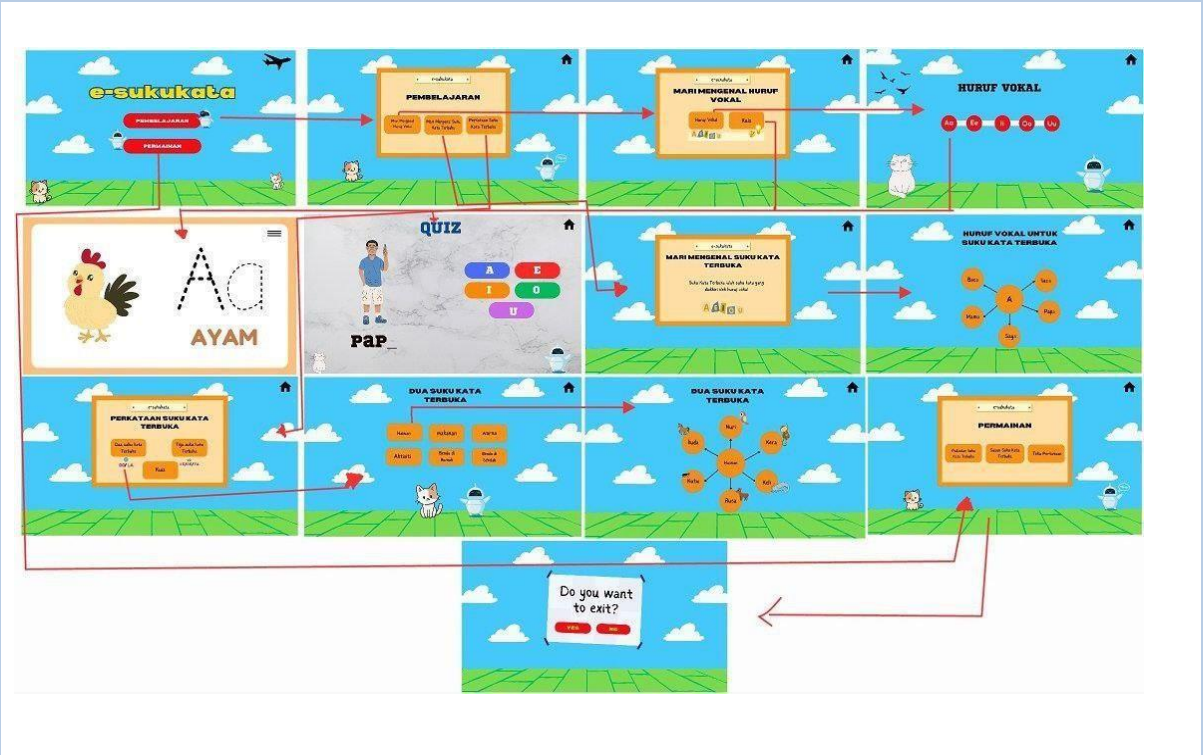

Figure 3 Wireframe of e-Sukukata Courseware

These design elements collectively contribute to the creation of an impactful and user-friendly e-learning courseware tailored for 4years-old kindergarten students learning suku kata terbuka in bahasa melayu.

Test Case

Moving to the Implementation phase, deploying the e-learning courseware involves introducing it to the kindergarten setting. Training educators on how to facilitate the use of the courseware and integrating it seamlessly into the existing curriculum is key. Continuous monitoring and feedback collection during this phase help identify any necessary adjustments. Table 3 shows the test case for the user.

Table 3 Test Case for the User

Test case	No.	Activity	Expected result
Homepage	1	Navigate to "Pembelajaran" and "Permainan" page.	Display the the "Pembelajaran" and "Permainan" button.
Pembelajaran page	1	Go to the Pembelajaran page	It will display "Mari Mengenal Huruf Vokal", "Mari Mengenal Suku Kata Terbuka", and "Perkataan Suku Kata Terbuka" buttons. The page also has home button.
	2.	Click on the "Mari Mengenal Huruf Vokal" button.	Navigate to the "Mari Mengenal Huruf Vokal" page.
	3.	Click on the "Mari Mengenal Suku Kata Terbuka" button.	Navigate to the "Mari Mengenal Suku Kata Terbuka" page.
	4.	Click on the "Perkataan Suku Kata Terbuka" button.	Navigate to the "Perkataan Suku Kata Terbuka" page.
	5.	Click the home button	It will display homepage.
Mari Mengenal Huruf Vokal page	1.	Go to the Mari Mengenal Huruf Vokal page	It will display "Huruf Vokal" and "Kuiz" buttons. The page also has home button.
	2.	Click on the "Huruf Vokal" button.	Navigate to the "Huruf Vokal" page.
	3.	Click on the "kuiz" button.	Navigate to the "kuiz" page.
	4.	Click the home button	It will display homepage.
Mari Mengenal Suku Kata Terbuka page	1.	Go to the Mari Mengenal Suku Kata Terbuka page.	It will display the notes and forward buttons. The page also has home button.
	2.	Click the home button.	It will display homepage.
Perkataan Suku Kata Terbuka page	1.	Go to the Perkataan Suku Kata Terbuka page.	It will display "Dua Suku Kata Terbuka", "Tiga Suku Kata Terbuka", and "Kuiz" buttons. The page also has home button.
	2.	Click on the "Dua Suku Kata Terbuka" button.	Navigate to the "Dua Suku Kata Terbuka" page.
		Click on the "Tiga Suku Kata Terbuka" button.	Navigate to the "Tiga Suku Kata Terbuka" page.
	3.	Click on the "kuiz" button.	Navigate to the "kuiz" page.
	4.	Click the home button	It will display homepage.
Permainan page	1.	Go to the Permainan page	It will display "Padankan Suku Kata Terbuka", "Susun Suku Kata Terbuka", and "Teka Perkataan" buttons. The page also has home button.
	2.	Click on the "Padankan Suku Kata Terbuka" button.	Navigate to the "Padankan Suku Kata Terbuka" page.
	3.	Click on the "Susun Suku Kata Terbuka" button.	Navigate to the "Susun Suku Kata Terbuka" page.

	4.	Click on the “Teka Perkataan” button.	Navigate to the “Teka Perkataan” page.
	5.	Click the home button.	It will display homepage.

Conclusion

In conclusion, the systematic application of the ADDIE model offers a comprehensive framework for developing e-learning courseware tailored to the specific requirements of 4-year-old kindergarten students learning sukukata terbuka in Bahasa Melayu. Commencing with the Analysis phase, a thorough understanding of learners' cognitive development, preferences, and learning environment is established. The Design phase constructs a blueprint integrating vibrant multimedia elements and a user-friendly interface, mindful of the young audience's unique traits. During Development, interactive modules and relevant content are generated, with usability testing ensuring alignment with educational objectives. Implementation involves educator training and seamless integration into the curriculum. Lastly, the Evaluation phase, segmented into areas such as User Interface, Functionality, Navigation, Activities, and Multimedia Elements, critically evaluates overall effectiveness and user satisfaction. Surveys, observations, and analytics yield valuable insights, driving iterative enhancements in interface design, functionality, navigation clarity, activity engagement, and multimedia integration. This holistic approach guarantees a refined and optimized e-learning experience, ultimately augmenting sukukata terbuka instruction effectiveness for 4-year-old Bahasa Melayu learners.

References:

Agno, A. C. G., & Ponte, A. P. (2013). Interactive Courseware for Preschoolers. *Asian Journal of Business and Governance*, *1*(1), 140.

Ahmad, W., & WA, S. (2012). Intrumental Phonetic Study of the Rhythm of Malay. *PhD, Newcastle University*

Branson, R. K. (1975). *The ADDIE model*. Centre for Educational Technology, Florida State University.

Rahayu, N. W., Ferdiana, R., & Kusumawardani, S. S. (2022). A systematic review of ontology uses in E-Learning recommender system. *Computers and Education: Artificial Intelligence*, *3*, 100047.