

THE FRAMEWORK OF e-SUKUKATA BAHASA MELAYU KINDERGARTEN COURSEWARE USING ONTOLOGY-BASED TECHNIQUE

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ABSTRACT

Multimedia e-learning tools hold significant promise in enhancing learning outcomes for 4-year-old students, nurturing linguistic proficiency, memory, and critical thinking development. Learning about "suku kata terbuka" in Bahasa Melayu poses numerous challenges for 4-year-old students. Initially, their developmental stage hinders their ability to recognize these syllables, making it difficult to differentiate between open and closed syllables. While some children can pronounce consonant letters individually, the problem arises that they struggle with combining them with vowel sounds, particularly in consonant-vowel (KV) syllables. Moreover, these young learners encounter difficulties in vocabulary development. Their limited vocabulary obstructs their understanding of words containing "suku kata terbuka," affecting both reading and speaking skills. Another issue arises from the inadequacy of current vocabulary learning methods for 4-year-old Bahasa Melayu learners. Existing approaches may not cater to their needs, resulting in comprehension gaps and a lack of Malay vocabulary. Similarly, in Bahasa Melayu, students' restricted vocabulary significantly affects their learning process, highlighting the importance of effective vocabulary learning strategies. Teachers play a crucial role in implementing tailored instructional strategies, with Bahasa Melayu providing a cultural and linguistic context for linguistic exploration. Thus, this project aims to address these challenges by integrating knowledge management, system thinking techniques, and an ontology-based approach into e-learning courseware focused on "suku kata terbuka" for 4-year-old students. The comprehensive approach seeks to provide a culturally relevant educational experience, focusing on the domain of study and the specific needs of 4-year-old students. Incorporating "suku kata terbuka" in the curriculum extends beyond linguistic development, boosting students' self-esteem, enhancing system thinking, and heightening interest in learning Bahasa Melayu.

Keywords: Courseware Development, Ontology, Kindergarten, Bahasa Melayu, sukukata

Introduction

E-learning technology has ushered in a profound transformation in education delivery, offering dynamic and captivating learning environments that greatly improve learning outcomes. Teachers can enhance student learning by facilitating self-paced learning, delivering timely feedback, and customizing education through course materials. Interactive courseware plays a pivotal role in promoting efficient and effective learning, providing structured content, multimedia components, assessments, and interactive functionalities. Agno and Ponte (2013) research confirm the positive impact of interactive courseware on student performance.

Efficient knowledge management is essential in e-learning multimedia courseware, especially in kindergarten education. Educators can employ knowledge management practices to organize, capture, store, and disseminate relevant learning materials, thus establishing a comprehensive resource for students. Petrides and Nodine (2003) emphasize the promising potential of knowledge management practices in educational settings, offering a strategic framework to optimize knowledge utilization and enhance educational outcomes. System thinking techniques are crucial in designing effective e-learning multimedia courseware, particularly for kindergarten students. Incorporating system thinking into courseware significantly improves learners' critical thinking and problem-solving abilities. Westra (2008) highlights the utility of systems thinking and modeling in providing clarity and comprehension.

The Ontology-based Technique serves as a potent strategy for enhancing learning outcomes in e-learning multimedia courseware. By utilizing an ontology-based semantic framework to structure course content, students can access pertinent information and resources tailored to their individual needs and learning preferences. Rahayu et al. (2022) underscores the crucial role of ontologies in adaptive learning technology, highlighting how implementing this technique can personalize the learning experience and optimize outcomes for students.

In the context of teaching *Bahasa Melayu* to kindergarten students, e-learning multimedia courseware offers a promising avenue for improving learning outcomes. By integrating interactive elements like videos, games, and audio clips, e-learning courseware can captivate young learners' attention and make the learning process more engaging. This multimedia approach facilitates a dynamic and interactive learning experience, catering to the diverse learning styles and preferences of kindergarten students. Additionally, e-learning courseware allows students to learn at their own pace, enabling personalized learning experiences tailored to individual needs and abilities. Through interactive exercises and activities, students can actively engage in their learning, reinforcing language skills in an enjoyable and interactive manner. Furthermore, e-learning courseware provides immediate feedback, enabling students to monitor their progress and address areas needing improvement promptly.

Moreover, integrating e-learning courseware into *Bahasa Melayu* instruction can enhance access to educational resources, particularly in remote or underserved areas where traditional teaching materials may be scarce. Overall, e-learning multimedia courseware holds significant potential to revolutionize the teaching and learning of *Bahasa Melayu* for kindergarten students, fostering a more engaging, effective, and accessible educational experience.

Thus, the primary focus of this research concentrates on crafting interactive courseware tailored for kindergarten-aged students, specifically those within the 4-year-old age bracket. This work incorporates various techniques including multimedia elements, knowledge management, system

thinking, and ontology, aiming to enhance the learning experience for these young learners. The overarching goal is to facilitate the improvement of students' learning skills by integrating these techniques comprehensively.

To achieve this objective, the study proposes the development of interactive courseware designed to aid 4-year-old students in learning *Bahasa Melayu*, with a particular emphasis on *sukukata terbuka*. The specific aims of this study are outlined as follows:

- i. Identifying the requisite teaching and learning requirements for *sukukata terbuka* in *Bahasa Melayu* among kindergarten students.
- ii. Designing and implementing *Bahasa Melayu* courseware utilizing ontology-based techniques tailored to 4-year-old learners.

The subsequent section will explain an exploration of related work within the range of e-learning technology. Following this, the study will present the methodology framework employed. Finally, the paper will conclude with a summary of the study.

Related Work

Multimedia courseware is crucial in improving e-learning experiences for 4-years-old kindergarten students studying *suku kata terbuka* in *bahasa melayu*. Interactive games featuring *suku kata terbuka* exercises, for example, can create engaging and dynamic platforms for youngsters to learn phonetic ideas. Through interactive, multimedia-rich courseware, this technique not only catches attention but also caters to varied learning styles, developing a more comprehensive grasp of *suku kata terbuka*.

i. Assistive Courseware

When learning *suku kata terbuka* in *bahasa melayu*, assistive courseware plays a critical role in improving the e-learning experience for 4-years-old kindergarten students. For example, interactive multimedia tools such as “Belajar Mengeja ABC, Perkataan”, “Belajar Membaca Tanpa Mengeja”, and “Belajar Menulis ABC, Suku Kata” provides a gamified approach by mixing audio-visual features and interesting exercises. These assistance technologies create a multisensory learning environment that caters to different learning styles while also grabbing the interest of young learners. According to Chua et al. (2019), such multimedia interventions have a positive influence on preschoolers' *suku kata terbuka* understanding and retention. The previous study said that relevance of age-appropriate content and interactive features in maintaining children's interest and generating a pleasurable learning experience. Using these findings, the design and deployment of assistive courseware is critical in optimizing the language learning experience for 4-years-old students in the context of *suku kata terbuka* instruction in *bahasa melayu*.

ii. *E-Learning*

E-learning has emerged as a promising option for supporting early language development, notably in the context of multimedia courseware for *suku kata terbuka* in *bahasa melayu* for 4-years-old kindergarten students. Interactive e-learning tools are beneficial in engaging young learners and improving their linguistic skills and the value of age-appropriate multimedia information, emphasizing its favorable impact on toddlers' comprehension and memory of linguistic concepts. These studies provide important insights into the design and execution of e-learning strategies that are tailored to the needs of young children in the realm of *suku kata terbuka* education.

a. *Web-based E-Learning Applications*

A web-based e-learning application is a web-based educational platform or system that allows users to engage in learning activities, access resources, and participate in courses online. Multimedia content, interactive modules, evaluations, and collaboration tools are common components. Web-based e-learning applications emphasize content and activity delivery via web browsers and technology-based eLearning applications use various technologies to enhance the learning experience, going beyond traditional content delivery methods. Within the larger landscape of e-learning, each serves a distinct purpose. Examples of Web-based E-Learning Applications as shown below (in Figure 1).



Figure 1: Web-based E-Learning Applications

b. Technology based E-Learning Applications

Educational tools and platforms that use digital technology to enable the delivery of educational information and resources are referred to as technology-based e-learning applications. To enhance the learning experience, these programmed frequently incorporate multimedia elements, interactive capabilities, and online connectivity. Technology based E-Learning Applications can include various technologies like mobile applications or desktop software. Examples for Technology based E-Learning Applications as shown below (in Figure 2).

Courseware Development Framework

This project aims to explore "suku kata terbuka" for 4-year-old students, incorporating knowledge management and system thinking techniques, alongside an ontology-based approach, as essential components of e-learning courseware. In *Bahasa Melayu*, "suku kata terbuka" refers to syllables ending with a vowel sound without a subsequent consonant, where the vowel sound is pronounced distinctly, contributing to the language's rhythmic flow. Ahmad and WA (2012) study identified such syllables through instrumental phonetic analysis.

Within this project, teachers, 4-year-old students, *Bahasa Melayu*, and the concept of "suku kata terbuka" are central. Teachers play a pivotal role in implementing effective instructional strategies tailored to meet developmental needs and ensure engagement. *Bahasa Melayu* provides a cultural and linguistic context, emphasizing language acquisition, with "suku kata terbuka" serving as a focal point for linguistic exploration.

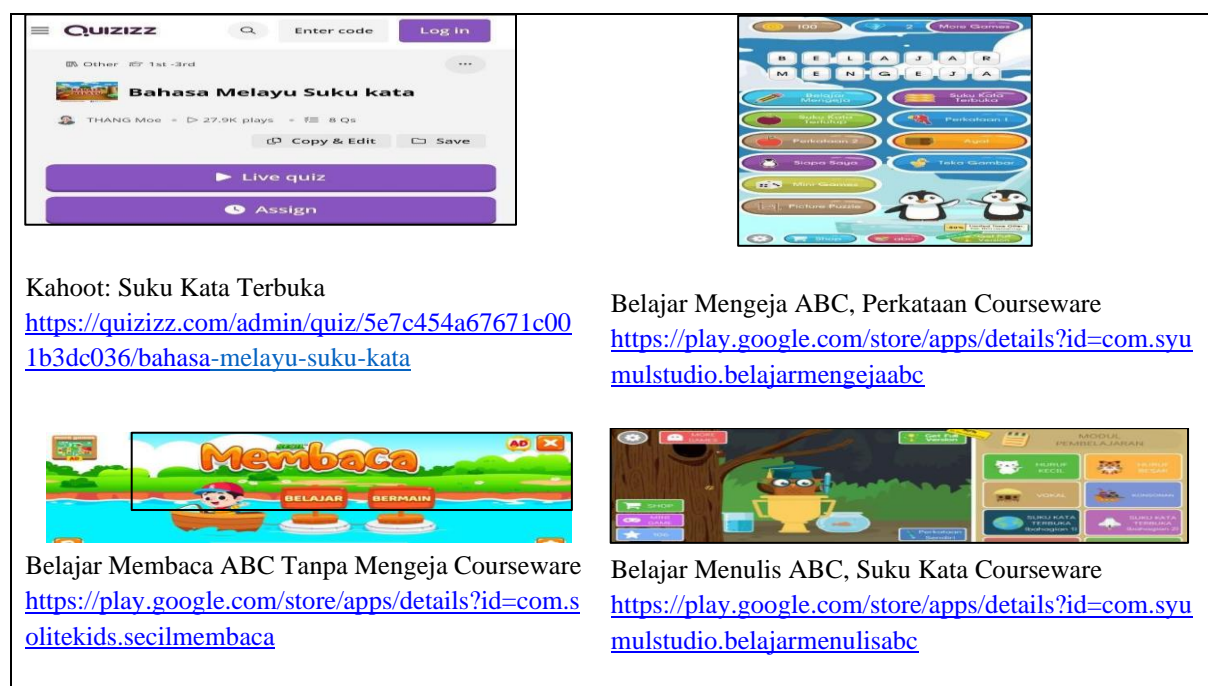


Figure 2: Technology based E-Learning Applications

The ADDIE (Analysis, Design, Development, Implementation, Evaluation) model was employed in this project to develop multimedia courseware for 4-year-old students learning *Bahasa Melayu*, with a specific focus on *sukukata terbuka*. The evaluation phase assesses the effectiveness of instructional strategies, allowing for iterative adjustments to enhance the learning experience for these young learners. Table 1 is the outlines of the project framework for the development of the *e-sukukata* courseware.

This holistic approach aims to offer a culturally relevant educational experience for 4-year-old students in *Bahasa Melayu* and "*suku kata terbuka*" learning. The courseware focuses on two main elements: the domain of study (knowledge management, system thinking technique, ontology-based technique) and the needs of 4-year-old students.

The significance of incorporating "*suku kata terbuka*" in the *Bahasa Melayu* subject for 4-year-old students extends beyond linguistic development. Firstly, it enhances students' self-esteem as they grasp linguistic concepts, fostering a positive attitude towards learning. Additionally, exposure to "*suku kata terbuka*" enhances students' system thinking by encouraging cognitive processes associated with language structure and pattern recognition, laying the foundation for broader cognitive development. Furthermore, integrating "*suku kata terbuka*" into the curriculum heightens students' interest in learning *Bahasa Melayu*, making the learning process enjoyable and stimulating.

Table 1: Project Framework

Phase	Objective	Activity	Outcomes
Analysis	<ol style="list-style-type: none"> 1. Identify the current understanding of 4-years-old regarding "<i>Suku kata terbuka</i>." 2. Assess the learning environment and potential challenges. 3. Understand the cognitive development and preferences of 4-years-old. 	<ol style="list-style-type: none"> 1. Conduct an interview with educators. 2. Observe kindergarten classes to gauge students' current knowledge. 3. Review literature on child development and early language acquisition. 	<ol style="list-style-type: none"> 1. Clear understanding of the baseline knowledge and challenges. 2. Insights into the learning preferences and cognitive abilities of 4years-olds. 3. Initial data to inform the design phase.
Design	<ol style="list-style-type: none"> 1. Develop a blueprint for the eLearning courseware. 2. Design engaging and appropriate multimedia elements. 3. Create a user-friendly interface for easy navigation. 	<ol style="list-style-type: none"> 1. Brainstorm and sketch the course structure and content flow. 2. Design colourful and visually appealing animations. 3. Create wireframes for the e-learning platform. 	<ol style="list-style-type: none"> 1. Detailed course structure and content plan. 2. Engaging multimedia elements designed for 4years-olds. 3. User-friendly wireframes for the courseware.

Development	<ol style="list-style-type: none"> 1. Bring the design to life by building interactive modules. 2. Incorporate appropriate content and language. 3. Conduct usability testing with the target audience. 	<ol style="list-style-type: none"> 1. Develop interactive games and activities. Create animated characters and scenarios. 2. Test the courseware with small groups of 4-years-olds for feedback. 	<ol style="list-style-type: none"> 1. Fully functional and interactive elearning modules. 2. Appropriate content integrated into the courseware. 3. Usability testing feedback for further improvements.
Implementation	<ol style="list-style-type: none"> 1. Deploy the e-learning courseware in kindergarten settings. 2. Train educators on how to facilitate its use. 	Provide ongoing support to educators.	<ol style="list-style-type: none"> 1. Educators proficient in using the elearning courseware. 2. Smooth integration into the curriculum. 3. Identified areas for continuous support and improvement.
Evaluation	<ol style="list-style-type: none"> 1. Assess the effectiveness of the eLearning courseware. 2. Measure learning outcomes and engagement. 3. Gather feedback from educators, parents, and students. 	<ol style="list-style-type: none"> 1. Analyse assessment results and user engagement metrics. 2. Collect feedback through surveys and interviews. 3. Iterate on the courseware based on evaluation findings. 	<ol style="list-style-type: none"> 1. Clear understanding of the courseware's impact on learning. 2. Identified areas for enhancement based on feedback. 3. Revised and improved eLearning courseware for sustained effectiveness.

Open syllables in *Bahasa Melayu* are syllables that end with a vowel sound without any subsequent consonant sound, contributing to the language's smooth cadence. Effective knowledge management is crucial in e-learning multimedia courseware for the *Bahasa Melayu* subject, aiding in organizing and providing easy access to course content. System thinking techniques play a crucial role in fostering an understanding of open syllables among students. An ontology-based technique serves as an effective strategy to improve learning outcomes, categorizing open syllables under themes such as Animals and vowels "A."

The use of multimedia e-learning tools for the *Bahasa Melayu* subject holds significant promise in enhancing learning outcomes for children as young as four years old, facilitating not only linguistic proficiency but also memory and critical thinking development.

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.

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