



The Acceptance of *Kumatalibi.com* for Biology Learning Enrichment: Prospective Teacher Students' Perspective

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ABSTRACT

This study investigates the acceptance of prospective biology teacher students toward the Kumatalibi.Com, a web-based digital learning resource center. The research employs the Unified Theory of Acceptance and Use of Technology (UTAUT) model to examine the factors influencing technology adoption. A total of 100 prospective biology teacher students from a state Islamic university in Bandung participated as respondents. Data were collected through questionnaires and analyzed using SmartPLS software. The study focused on four key UTAUT factors: affective need (14.2%), effort expectancy (16.5%), facilitating conditions (36.9%), and performance expectancy (24.1%). The findings reveal significant insights into the factors driving the acceptance of the Kumatalibi.Com web-based learning resource. The results indicate that facilitating conditions play a dominant role, followed by performance expectancy, effort expectancy, and affective need. These insights are crucial for developing effective strategies to enhance the promotion and use of the Kumatalibi.Com platform in educational settings. The study contributes to a better understanding of the technology acceptance process, offering valuable implications for the design and implementation of digital learning tools in teacher education programs.

Keywords: biology education, perspective of prospective teacher students, SEM-PLS, technology acceptance, UTAUT

INTRODUCTION

"Knowledge increases by sharing, not saving" encapsulates the current educational landscape, where the exchange of teaching materials is regarded as more meaningful than their mere preservation. The implementation of online learning policies during the pandemic and their continued use during the transition to the "new normal" have provided valuable alternatives for education. The new normal period has shifted learning from traditional face-to-face methods to a more integrated approach involving technology. This allows students and learners to access educational resources digitally, removing the necessity for physical proximity to educators. Although face-to-face learning has resumed, certain activities traditionally conducted in-person are now being successfully carried out virtually due to the ongoing effects of the pandemic.

The integration of Information and Communication Technology (ICT) in education has garnered considerable attention worldwide, particularly in enhancing subject-specific learning, such as Biology. Digital platforms have proven to be valuable tools for enriching Biology education among prospective teacher students. Research indicates that the effective use of ICT in Biology education is contingent upon both the infrastructural readiness of educational institutions and the attitudes of educators towards digital integration (Belay et al., 2020; Har et al., 2019). Studies demonstrate that when prospective teachers perceive ICT tools as useful and easy to incorporate into their curricula, the likelihood of adoption and sustained use increases. However, it is important to acknowledge that the use of digital-based media requires internet connectivity, which has both advantages and disadvantages. One significant challenge is the cost of data required for accessing online platforms, highlighting the crucial role of the internet in web-based learning environments.

Websites, as digital repositories, combine images, text, and videos to provide a comprehensive resource that supports the understanding of complex biological content, which cannot be simply memorized but requires deeper comprehension and analysis. High school Biology encompasses the study of living organisms and their environments, both visible and invisible to the naked eye. It emphasizes the systematic understanding of nature and its interconnections. This learning process necessitates not only memorization but also higher-order thinking skills, such as analysis and critical thinking (Sadiman, 2020). In contrast, learning resources, which encompass people, messages, tools, techniques, settings, and materials, play a pivotal role in facilitating this process. Among these, learning media—whether designed or utilized—are essential for effective educational management.

In the realm of digital learning resources, the development of qualified digital competencies is crucial. Without these skills, it is advisable to make use of existing learning resources. Effective use of media and learning resources enhances student motivation, engagement, and focus, enriching the overall learning experience. When various teaching materials, presented through different media formats, are consolidated into a single platform or repository, they become more manageable and accessible for both students and instructors. A learning resource center (LRC) or a website serves as such a platform, offering a centralized space where materials can be organized and accessed. This approach not only supports flexible learning outside the classroom but also allows teachers to engage with students without the constraints of time and space (Kurniawan, 2017).

The acceptance of digital platforms in education can be effectively analyzed through the Unified Theory of Acceptance and Use of Technology (UTAUT) model. This theoretical framework, along with the Technology Acceptance Model (TAM), provides robust foundations for assessing the factors influencing the adoption of digital tools among students. Empirical studies have identified key factors such as social influence, perceived usefulness, and ease of use, which are critical in determining the likelihood of technology adoption in educational contexts (Darmawan & Umamah, 2019; Yueh et al., 2015). The extended UTAUT model has been successfully applied to understand students' behavioral intentions toward digital learning platforms, offering valuable insights into the acceptance of digital tools in educational settings.

Furthermore, the adoption of ICT tools is shaped by the pedagogical and technical support available to teachers during training. Research indicates that prospective teachers who are well-versed in ICT integration strategies tend to exhibit more positive attitudes toward the use of digital technologies in their teaching practices (Aslan & Zhu, 2016; Belay et al., 2020). Continuous professional development and training in ICT skills further enhance these positive perceptions, fostering sustainable integration of digital platforms in Biology education. The readiness of pre-

service Biology teachers to embrace ICT-mediated learning underscores the potential of digital platforms to enrich their teaching methods when accompanied by adequate support measures.

Given the background outlined above, there is a clear need to develop a web-based platform that facilitates the enrichment of digital learning resources for high school Biology education, particularly in the context of the new normal transition and the evolving educational curriculum. This study aims to develop an integrated learning portal in the form of a web-based digital learning resource center, designed to enhance the teaching materials for high school Biology lessons. The outcomes of this research can serve as a reference for the development of digital Biology teaching resources that can be utilized by educators across Indonesia. The acceptance of digital platforms for Biology learning enhancement among prospective teacher students is influenced by a combination of factors, including perceived usefulness, ease of use, social influence, and adequate institutional and professional support. Studies utilizing the UTAUT framework confirm that addressing these factors increases the likelihood of positive reception and effective use of digital platforms in educational settings (Belay et al., 2020; Darmawan & Umamah, 2019; Yueh et al., 2015). Future research should continue to explore these theoretical perspectives to refine ICT integration strategies and optimize the benefits of digital learning environments in teacher education.

METHODOLOGY

This study employs a Design and Development (D&D) research methodology aimed at creating a web-based digital learning resource center to enhance teaching materials for SMA/MA Biology education. The methodology chosen is design-based research, which focuses on product creation and evaluating its effectiveness. Research and Development (R&D) methodologies, as outlined by Munawaroh (2015), are designed to either create new educational products or improve existing ones that can be justified for their educational value.

In the context of D&D research, two primary categories exist: (1) Product and Tool Research, and (2) Research Models. This study falls under the first category, Product and Tool Research, which centers on the educational process of product design and development, involving analysis and evaluation of the product in terms of design and development. According to Richey & Klein (2014), recent studies in this field primarily focus on product and tool-based development technologies. The research methodology involves a descriptive approach, examining the physical development of the product without using formulated hypotheses. The specific focus of this research is on the development of a Web-Based Digital Learning Resource Center to enrich the teaching materials for SMA/MA Biology lessons. The platform will utilize modern and user-friendly web development tools like WordPress to create an engaging and up-to-date resource that motivates students.

The population for this study consists of all prospective biology teacher students at a State Islamic Religious College (PTKIN) in Bandung, with a total of 486 students. The research sample includes 96 prospective biology teacher students from the class of 2023 who participated by filling out a questionnaire. Population and sample selection are critical to ensure the validity and reliability of the research outcomes. The population is defined as the entire group of individuals with specific characteristics relevant to the study, while the sample represents a subset of this population chosen for observation and analysis (Apriyani et al., 2023; Rahayu et al., 2020). The study also emphasizes the importance of using appropriate sampling techniques, such as purposive sampling, which selects participants who best describe the phenomenon being studied, or total sampling, which involves including the entire population in the sample (Bertha & Santosa, 2022; Rahayu et al., 2020; Riinawati, 2021). For instance, in educational research, the

sample could be a selection of classes from a particular school to obtain more efficient and representative responses (Putriani et al., 2022).

This research follows a development approach using the ADDIE model, created by Lee and Owens (2004), which consists of five stages: analysis, design, development, implementation, and evaluation. However, due to time constraints, the researcher was only able to complete the planning stage of the investigation (Figure 1).

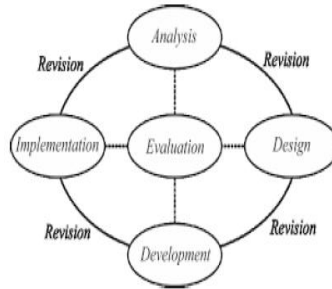


Figure 1. ADDIE Development Model (Sugiono, 2016)

Figure 1 illustrates the stages of the ADDIE development model, which was adopted as the research approach for this study. The ADDIE model is widely recognized as a structured framework designed to create effective and dynamic learning experiences. It serves as a roadmap to guide the development of educational tools and materials, ensuring that the learning process is both engaging and efficient (Barokati & Annas, Kurnia et al., 2019). As Tegeh and Kirna (Kurnia et al., 2019) describe, research and development (R&D) is a systematic procedure that focuses on identifying needs, creating, producing, and testing materials until they meet specific standards. Prior to product development, "preliminary research" is conducted to assess whether the product is genuinely required. This phase ensures that the final product is meaningful and aligned with the educational goals. According to (Yuberti, 2014), R&D methods are employed to develop superior products that address identified needs. By employing this method, it is anticipated that the resulting learning products will meet the standards of effectiveness, efficiency, and quality.

The primary focus of this development is in the field of education, specifically the creation of a web-based digital education resource center, such as kumatalibi.com, to enhance teaching materials for SMA/MA Biology lessons. This development process is outlined in the flowchart presented in Figure 2, which visually represents the steps taken to design and develop the product for enriching high school Biology education.

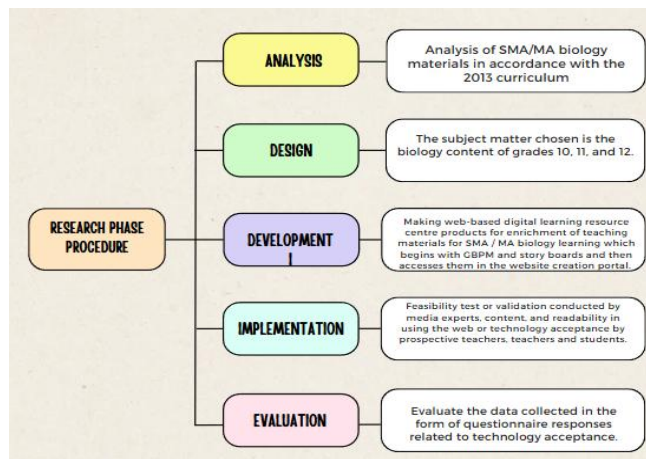


Figure 2: The Steps Involved in The Research Process

To provide a clear overview of the stages to be completed in this research, Figure 2 outlines the steps of the research plan, aligning with the research methodology and supported by relevant references. The purpose of these steps is to guide the researchers efficiently through the process. As Hernández et al (2013) noted, a well-designed website as a learning resource can significantly support educational activities. A quality website can enhance learning experiences, as evidenced by its effectiveness in assisting Chinese English as a Foreign Language (EFL) learners to improve their language competence and achieve optimal learning outcomes.

Technological advancements in recent years have made it possible for people to find solutions to a variety of problems through online platforms. The internet has become an integral part of daily life for millions worldwide, and its role in education is increasingly prominent. In particular, the use of online resources by language learners has gained considerable importance (Aguayo-Arrabal et al., 2020). This research aims to leverage similar principles to enhance the effectiveness of Biology education through a web-based digital learning resource center, supporting the development of teaching materials for SMA/MA Biology lessons. The stages outlined in Figure 2 will facilitate the development of this resource center, ensuring that the platform is well-designed and can offer meaningful educational support.

RESULT AND DISCUSSION

Analysys

High school biology curricula often encounter challenges related to content overload and the lack of integration across sub-disciplines such as zoology, botany, and genetics. Recent proposals for curriculum reform advocate for the use of hierarchical conceptual frameworks to identify essential concepts and their interconnections, thereby fostering a more integrated understanding of biological sciences. A balanced inclusion of concepts from functional and evolutionary biology, alongside systemic components and processes, is recommended to create a cohesive and meaningful curriculum (De Carvalho et al., 2020). Content analysis based on the existing curriculum thus becomes crucial as the foundation for developing a curated collection of educational materials, which will be packaged within the kumatalibi.com platform. The developed materials are subsequently validated to assess their feasibility and effectiveness as instructional tools.

Design

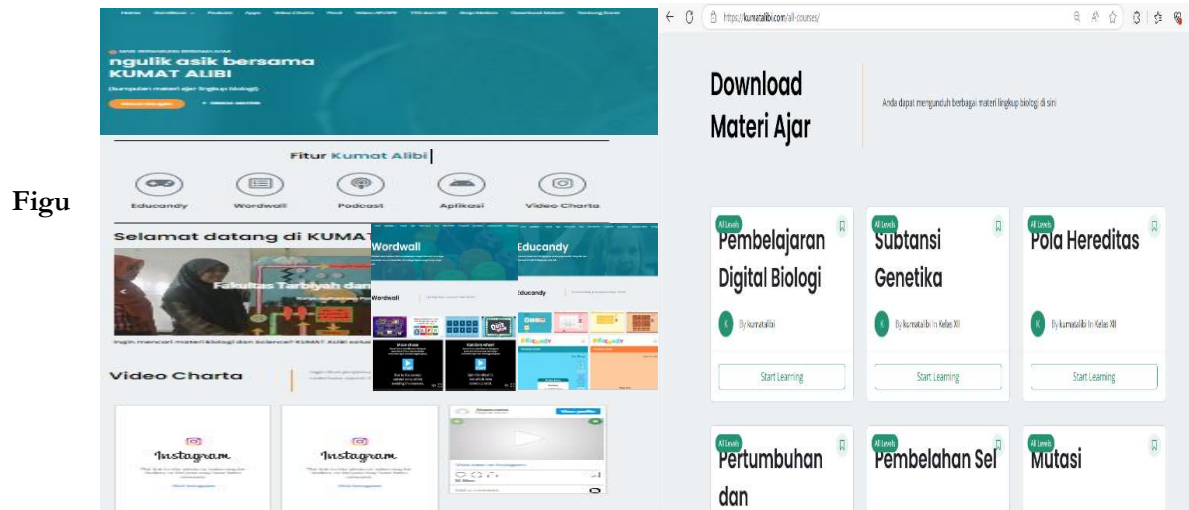
Design plays a pivotal role in media development, greatly influencing how audiences perceive, comprehend, and interact with content. Effective design enhances informational clarity, emotional engagement, and user interactivity, making it an indispensable element in both informational and educational contexts. Well-executed design principles—such as thoughtful typography, strategic color contrasts, and intuitive layouts—significantly improve the comprehensibility of information by directing the audience's attention to key messages (Mohamed, 2025). In developing kumatalibi.com, advanced technologies have been integrated to optimize both form and function. Specifically, the incorporation of image processing algorithms enhances usability and user satisfaction, streamlining human-computer interaction and elevating the overall learning experience (Xu, 2024).

Moreover, the use of storyboards in the development process plays a critical role in structuring educational materials. Commonly utilized in educational contexts, storyboards help organize content logically and visually, facilitating more structured learning experiences. Research has demonstrated that the use of storyboards in instructional material development—such as modules for creative writing—can significantly enhance student engagement and improve learning outcomes (Board, 2020). Through these strategies, kumatalibi.com aspires to provide a

dynamic, well-integrated digital resource to support the enrichment of high school biology education

Development

The primary outcome of this development research is the creation of kumatalibi.com, a comprehensive web-based digital learning resource center. The development process includes the construction and design of the kumatalibi.com website, optimized for accessibility across multiple platforms, including mobile devices, computers, and laptops. Supporting media were also produced to enhance user engagement and understanding, such as infographics for platform introduction, video tutorials demonstrating site navigation and usage, and web-based audio-visual learning content. Prior to the testing phase, a rigorous validation process was conducted involving multiple experts to ensure the quality and feasibility of the developed product. This included validation by material experts, media experts, language experts, and learning design experts. Their assessments were critical for refining and verifying the content, interface, and overall educational value of the platform. The manufactured products, representing the tangible outputs of this research, are illustrated in Figure 3.



Figur

3b. Kumatalibi Website Product
(collection of teaching materials in the scope of biology) <https://kumatalibi.com/>

Implementation

The implementation phase was conducted to evaluate the user acceptance of the kumatalibi.com digital learning resource center. Assessing user acceptance is a critical step in the product development cycle, as it provides valuable insights into the platform's usability, relevance, and overall effectiveness in meeting user needs. User feedback not only informs potential improvements but also validates the practical utility of the product in real educational contexts. An overview of the implementation process and the resulting evaluation data is presented in Figure 4.



Figure 4. The implementation process on biology teacher candidate students

Feasibility of Webiste digital learning resource centre *kumatalibi.com*

At this stage, a validation study was conducted on the *kumatalibi.com* digital learning resource center. The primary objective of this validation was to collect structured feedback that would allow the researchers to assess the product's quality and determine its feasibility for broader implementation. The media validation process was undertaken using previously established and validated instruments, applying an instrument judgment procedure to ensure that the evaluation tools themselves were reliable and appropriately constructed. During this validation phase, expert judgments were sought regarding various aspects of the platform, including the design, content accuracy, instructional relevance, and overall usability of the learning materials presented on the *kumatalibi.com* website. The study materials, learning components, and educational resources integrated into the platform were systematically reviewed and assessed for their alignment with educational standards and user needs.

The findings from this comprehensive media validation process are synthesized and summarized to provide a detailed evaluation of the *kumatalibi.com* digital learning resource center, as reported in the subsequent analysis.

Table 1. Recapitulation of Expert Assessment of Webiste digital learning resource centre *kumatalibi.com*

Criteria	Aspect	Results	Category
Material Expert	Content eligibility	80	highly feasible
	Feasibility Presentation		
Media Expert	Feasibility	89	highly feasible
	Graphics Technical Qualities		

Criteria	Aspect	Results	Category
Learning Expert	Feasibility	89	highly feasible
	Content		
	Language		
	Technical Qualities		

Website Acceptability Analysis of Kumatalibi.Com's Digital Learning Resource Center

Research has been conducted on the acceptance of the Webiste digital learning resource centre kumatalibi.com to 96 prospective biology teacher students at one of the Bandung state Islamic LPTK by distributing questionnaires. The factors tested in this study include attitudes, media needs, ICT habits, learning opportunities, self-confidence, supporting facilities, technology acceptance, social influence, self-confidence and ease of use. Furthermore, these factors are used as measurement indicators and compile a research model. This study uses indicator models and variables

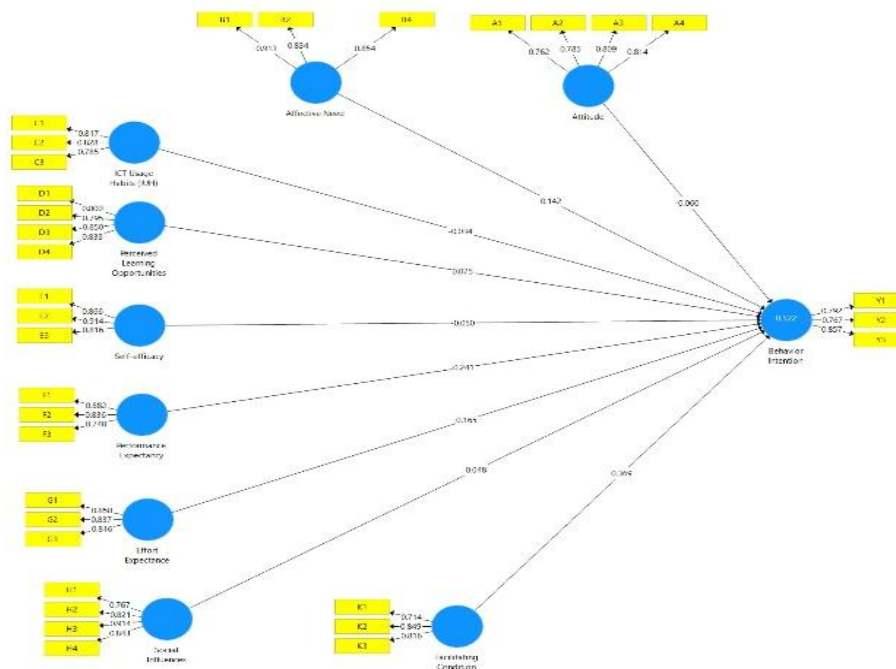


Figure 5. Analysis Results Model Diagram

Table 2. Path Coefficient

	Behavior Intention
Affective Need	0.142
Attitude	-0.060
Behavior Intention	
Effort Expectance	0.165
Facilitating Condition	0.369

Behavior Intention	
ICT Usage Habits (IUH)	-0.034
Perceived Learning Opportunities	0.075
Performance Expectancy	0.241
Self-efficacy	-0.050
Social Influences	0.048

This study investigates the factors influencing individuals' behavioral intentions by analyzing the path coefficients of several key variables. The findings reveal nuanced relationships, highlighting the interplay between emotional, cognitive, and contextual influences. Affective needs were found to have a positive and meaningful impact on behavioral intention, with a path coefficient of **0.142**. This suggests that when individuals experience strong emotional motivations, they are more likely to form intentions to engage in a particular behavior. Emotional resonance thus emerges as an important driver of action. Interestingly, the relationship between attitude and behavioral intention, indicated by a coefficient of **-0.060**, reveals a slight negative influence. This counterintuitive result suggests that less favorable attitudes may not significantly inhibit intention, and that other factors might moderate or outweigh the effect of attitude in decision-making.

Effort expectancy, reflected by a path coefficient of **0.165**, shows a positive contribution to behavioral intention. When individuals perceive that performing an action requires reasonable effort, their willingness to intend to engage increases. This finding highlights the importance of designing tasks that are perceived as manageable and accessible. Facilitating conditions, with the strongest positive path coefficient of **0.369**, emerge as the most influential factor affecting behavioral intention. The presence of environmental supports, such as access to resources and enabling infrastructures, greatly enhances individuals' readiness to act. In educational settings, for instance, the availability of internet-based learning resources allows teachers to develop flexible and accessible teaching materials, meeting the evolving demands of students (Muhaimin et al., 2019). The shift from traditional teaching methods to more innovative, multimedia-based approaches is critical to addressing contemporary educational challenges (Sadikin & Hakim, 2019).

On the other hand, ICT usage habits display a slight negative association with behavioral intention, with a path coefficient of **-0.034**. This result implies that frequent prior use of ICT does not necessarily translate into stronger behavioral intentions, possibly due to digital fatigue or mismatches between previous experiences and current behavioral goals. As Allison Allison et al. (2019) noted, both experts and end-users are crucial in identifying areas of improvement in digital platforms, emphasizing the need for continuous refinement based on user experience. Additionally, perceived learning opportunities were found to positively influence behavioral intention, albeit modestly, with a path coefficient of **0.075**. When individuals recognize the potential to gain new knowledge or skills, their motivation to engage in an action increases accordingly. Meanwhile, self-efficacy demonstrated a minor negative effect, with a path coefficient of **-0.050**, indicating that a lack of confidence in one's ability can serve as a subtle barrier to the formation of intention.

Overall, the findings reveal that behavioral intention is shaped by a complex interaction of emotional factors, cognitive evaluations, and contextual supports. Among all the variables examined, **facilitating conditions (36.9%)**, **performance expectancy (24.1%)**, **effort expectancy (16.5%)**, and **affective needs (14.2%)** emerged as the most influential predictors of behavioral intention. These results underscore the importance of creating supportive

environments, ensuring that tasks are perceived as achievable, highlighting the benefits of action, and fostering emotional engagement to effectively strengthen individuals' intention to act.

Table 3. R Square

	R Square	R Square Adjusted
Behavior Intention	0,522	0,470

The values of R Square (R^2) and Adjusted R Square (Adjusted R^2) offer crucial insights into the explanatory power of the regression model used to predict behavioral intention. In this study, an R^2 value of **0.522** indicates that approximately **52.2%** of the variation in behavioral intention can be explained by the set of independent variables included in the model. This suggests that the model provides a reasonably strong representation of the key factors influencing individuals' intentions to engage in a particular behavior.

However, while R^2 measures the overall goodness of fit, it does not account for the complexity of the model, particularly in relation to the number of predictors used. To address this, the Adjusted R^2 value, calculated at **0.470**, offers a more conservative estimate by adjusting for the number of independent variables and sample size. This means that, after accounting for model complexity, about **47.0%** of the variation in behavioral intention is still explained by the predictors.

The comparison between R^2 and Adjusted R^2 underscores that although the model incorporates multiple variables, it does not suffer from excessive overfitting; the explanatory power remains substantial even after adjustment. In sum, these two metrics together suggest that the regression model fits the data adequately, balancing explanatory strength with model parsimony, and thus provides a meaningful understanding of the factors driving behavioral intention.

Table 4. F Square

	Behavior Intention
Affective Need	0.017
Attitude	0.002
Behavior Intention	
Effort Expectance	0.030
Facilitating condition	0.139
ICT usage Habits (IUH)	0.001
Perceived Learning Opportunities	0.005
Performance Expectancy	0.046
Self-efficacy	0.002
Social Influences	0.002

Table 5. Construct validity

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Affective Need	0.863	0.851	0.901	0.753
Attitude	0.806	0.827	0.871	0.629
Behavior Intention	0.730	0.731	0.848	0.701
Effort Expectance	0.787	0.788	0.875	0.701
Facilitating condition	0.707	0.717	0.873	0.632
ICT usage Habits (IUH)	0.747	0.769	0.852	0.657
Perceived Learning Opportunities	0.839	0.852	0.891	0.672
Performance Expectancy	0.763	0.787	0.863	0.679
Self-efficacy	0.833	0.836	0.900	0.751
Social Influences	0.858	0.866	0.904	0.702

The findings from the construct validity evaluation reveal several important metrics that assess the legitimacy and robustness of the measurement instruments used for the study's variables. Firstly, **Cronbach's Alpha**, which measures the internal consistency among items within each variable, yielded relatively high values across all constructs, ranging from **0.707 to 0.858**. These results indicate a strong internal reliability, suggesting that the items within each variable are consistent and measure the intended conceptual domain effectively. Similarly, the **rho_A** coefficient, another indicator of internal consistency, exhibited values between **0.717 and 0.866**, further affirming the reliability of the measurement instruments. High rho_A values strengthen the conclusion that the variables are accurately and consistently capturing the targeted constructs.

Moreover, **Composite Reliability** scores, ranging from **0.837 to 0.904**, reinforced the assessment of internal consistency, offering an alternative confirmation alongside Cronbach's Alpha. These high values imply that the variable measurement instruments are not only consistent but also suitable substitutes if alternative reliability measures are considered. In addition, the evaluation of **Average Variance Extracted (AVE)** provided insights into the convergent validity of the constructs. With AVE values ranging from **0.629 to 0.753**, the results indicate that a significant portion of the variance in each construct is captured by its indicators rather than by measurement error. High AVE values demonstrate that the measurement models effectively reflect the intended theoretical concepts.

Overall, these results collectively confirm that the measurement instruments employed in this study exhibit good construct validity. The instruments are consistent, reliable, and adequately capture the conceptual frameworks they were designed to measure, providing a strong foundation for subsequent analysis. In the context of hypothesis testing, the results show that among all variables analyzed, only the **Facilitating Condition** variable exerts a significant influence on **Behavioral Intention**. Other variables, although theoretically relevant, did not demonstrate a statistically significant effect in this model. This insight is crucial for researchers and decision-makers, as it highlights the need to prioritize facilitating factors when designing interventions aimed at influencing behavioral intentions.

Furthermore, the study's implications are aligned with prior research emphasizing the advantages of integrating multimedia-based learning through internet platforms. According to Putranto (2011), learning via the internet offers numerous benefits, including lower costs, flexible scheduling, adjustable learning speed, and increased overall learning effectiveness. Similarly, Puji et al. (2014) argue that using interactive multimedia technologies can enhance the clarity and tangibility of learning materials through the visualization of text, audio, images, videos, and animations. This, in turn, improves students' ability to remember and comprehend content, fosters greater enthusiasm for learning, and enhances learning outcomes. The accessibility of multimedia resources at any time and place not only boosts students' motivation but also provides alternative learning avenues that encourage positive and productive use of time. These observations are further supported by evidence indicating a high level of acceptance and effectiveness of technology in educational settings.

Thus, the integration of effective facilitating conditions and supportive technological interventions emerges as a key strategy in promoting positive behavioral intentions and improving educational outcomes.

CONCLUSION

Based on the evaluation results from media, material, and learning validity assessors, who provided an average accumulated score of 85%, it can be concluded that the kumatalibi.com digital learning resource center developed falls into the "Very Feasible" category and is suitable for use. The implementation stage, which involved teachers, learners, and practitioners, resulted in an average score of 83%, placing it once again in the "Very Feasible" category. The research indicates that the kumatalibi.com website can serve as an effective digital learning media alternative, increasing student interest in learning. It is also well-suited for use in the blended learning curriculum, providing valuable independent learning materials for SMA/MA students. The most significant finding of this study is that the facilitating conditions variable of the kumatalibi.com website was rated at 36.9%, indicating the importance of support and resources in enhancing the learning experience. However, one limitation of this study is that the sample size may not allow for generalization of the technology acceptance across all educational contexts. A recommendation for future development is to continue innovating the kumatalibi.com platform, ensuring its integration into learning environments and expanding its interactive learning features to further engage users and elicit positive feedback.

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