



INTERACTIVE ANIMATION MEDIA BASED ON PBL CONTAINING BIMA FOLKLORE TO IMPROVE CHARACTER AND DIGITAL LITERACY OF JUNIOR HIGH SCHOOL STUDENTS

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ABSTRACT

This study aims to develop interactive animation media based on Problem-Based Learning (PBL) integrated with Bima folklore "La Bibano Putri Kalepe" to improve the character and digital literacy of seventh-grade students at MTsN 5 Bima. The low character values and weak digital literacy skills among junior high school students served as the primary background of this study. The Research and Development (R&D) method was employed using the ADDIE development model (Analysis, Design, Development, Implementation, Evaluation). The research subjects consisted of 30 seventh-grade students selected through purposive sampling. Data were collected through expert validation questionnaires, character observation sheets, and pretest-posttest instruments. Validation results showed very valid percentages: media expert 92%, instructional design expert 90%, content expert 94%, and instrument expert 91%. Student responses regarding media practicality reached 91.67% (very practical). Gain score analysis showed an improvement in mean learning outcomes from 62.00 (pretest) to 87.00 (posttest) with an N-Gain of 0.66 (moderate-high category). Student character aspects improved significantly: responsibility 90%, social awareness 88%, leadership 89%, and digital ethics 91%. It is concluded that the developed media is proven valid, practical, and effective in improving character and digital literacy of junior high school students.

Keywords: *Interactive Animation Media; Problem-Based Learning; Bima Folklore; Character Education; Digital Literacy*

INTRODUCTION

The exponential development of information and communication technology in the era of Industrial Revolution 4.0 has brought fundamental transformation to all aspects of life, including formal education. The integration of digital technology into the learning process is no longer merely an innovative option but a strategic necessity so that students can compete globally and adapt to rapid change (Pratama & Susilowati, 2022). However, amid this technological progress, Indonesian education faces serious challenges in the form of student character degradation and weak digital literacy skills. These two problems are closely interrelated and require integrated, comprehensive handling from various stakeholders. Digital literacy is defined as the ability to use information technology productively, critically, safely, and responsibly across various contexts of life (Yudha et al., 2023). The results of the national digital literacy index survey released by the Ministry of Communication and Information Technology in 2023 showed that Indonesia's average digital literacy score reached only 3.54 out of a scale of 5.00, a tangible achievement still far from ideal conditions.

Among junior high school students, this condition is exacerbated by the lack of critical thinking skills toward digital content, high vulnerability to false information or hoaxes, and digital ethics that have not yet been internalized in daily life (Nuraini & Hidayat, 2023). Recent



research reveals the empirical fact that only 31% of junior high school students in Indonesia are able to independently distinguish valid information from hoaxes (Rizky & Hernawati, 2021). On the other hand, student character issues have also become a sharp focus of attention. The phenomenon of cyberbullying, the fading of respect for teachers, and decreasing social awareness are real indications that character education in schools has not been running optimally (Ministry of Education, Culture, Research, and Technology, 2022). This condition demands innovative learning approaches capable of naturally and contextually integrating character education into daily teaching and learning activities. One innovative solution offered is the use of interactive animation media that integrates local wisdom as a vehicle for instilling the nation's character values.

The Bima folklore entitled La Bibano Putri Kalepe is a cultural treasure rich in noble values including courage, responsibility, leadership, and social awareness. Integrating this folklore into digital learning media is expected to provide a meaningful context for students in understanding and internalizing character values, while also fostering a love for local culture (Zulkarnain et al., 2022). This step is in line with the mandate of the Kurikulum Merdeka (Independent Curriculum), which emphasizes the importance of strengthening identity and local wisdom in the national education process (Ministry of Education, Culture, Research, and Technology, 2022). The development of interactive animation media in this study is grounded in Mayer's multimedia theory, which states that learning is more effective when information is presented multimodally through a simultaneous combination of moving images, narrative audio, and text (Mayer, 2009). Multimedia principles such as coherence, modality, contiguity, and personalization form the foundation of the media design so that it can facilitate optimal cognitive processing in the learner's brain (Pramono & Wardani, 2023; Yusuf et al., 2022).

The problem-based learning (PBL) approach was chosen as the pedagogical basis for media development because it has proven effective in developing critical thinking skills, collaboration skills, and contextual problem-solving abilities in students (Susanto et al., 2022). Within the context of the Kurikulum Merdeka, PBL is highly relevant because it encourages student-centered learning and supports the achievement of the Pancasila Student Profile dimensions (Ministry of Education, Culture, Research, and Technology, 2022). The structured PBL syntax — comprising problem orientation, organizing students to learn, guiding individual and group investigation, developing and presenting work, and analyzing and evaluating the problem-solving process — was systematically integrated into the navigation flow of the animation media developed (Arends, 2012). A review of previous studies reveals a significant research gap in the field. Rizky and Hernawati (2021) developed animation media but did not integrate local wisdom or measure its impact on student character.

Safitri et al. (2022) integrated folklore into learning but used conventional media without leveraging the potential of digital interactivity. Meanwhile, Fatimah and Ramdani (2023) applied PBL assisted by digital media but did not consider the dimension of local culture. No research has yet been found that comprehensively integrates all four elements at once: interactive animation, PBL, Bima folklore, and the development of character and digital literacy as a single, measurable unit. The novelty of this research lies in four aspects: (1) the integration of the Bima folklore La Bibano Putri Kalepe as authentic learning content that has never before been digitized into an interactive media format; (2) the explicit application of PBL syntax within the navigation structure and storyline of the animation; (3) the measurement of the dual impact on both student character and digital literacy skills; and (4) the research context in a 3T (frontier, outermost, and disadvantaged) region, which has so far received little attention in research on developing learning media based on local wisdom. Based on the description above, this study

aims to develop, validate, and test the effectiveness of interactive animation media based on PBL containing the Bima folklore La Bibano Putri Kalepe in improving the character and digital literacy of seventh-grade students at MTsN 5 Bima.

RESEARCH METHOD

This development research applies the Research and Development (R&D) method using the operational procedures of the ADDIE model, which consists of five stages: analysis, design, development, implementation, and evaluation. This design was deliberately chosen because it has systematic work phases oriented toward continuous formative evaluation to produce a comprehensively validated instructional product (Branch, 2009; Tegeh et al., 2021). The research was conducted at MTsN 5 Bima, West Nusa Tenggara, in the even semester of the 2025/2026 academic year. The determination of field trial subjects applied a purposive sampling technique to directly select 30 seventh-grade students based on their level of academic representativeness. The researcher positioned themselves as the key instrument in designing the animated visualization of the folklore based on Project-Based Learning (PBL). To test the effectiveness of the improvement in student learning outcomes, a pre-experimental trial design in the form of a one-group pretest-posttest design was used, without involving a control group (Hake, 1999).

The primary data collection process was carried out directly using a 5-point Likert scale questionnaire to test the technical feasibility as assessed by media, content, instructional design, and instrument experts. The researcher also applied a structured rubric-scale observation sheet to map 4 dimensions of character, a user practicality response questionnaire, and 25 multiple-choice items based on Higher Order Thinking Skills (HOTS) during the pretest and posttest. All scores obtained from the instruments were processed using descriptive percentage analysis techniques to determine the product's level of validity (Arikunto, 2013). The success of improved understanding of the material was calculated mathematically using the normalized gain (N-gain) formula, by dividing the difference between the actual score and the maximum potential score (Hake, 1999). The interpretation scale established that the media was declared valid if the feasibility percentage reached a minimum threshold of 61%, and effectiveness was considered successful if the N-gain coefficient exceeded the minimum threshold of the moderate criterion of 0.30.

Table 1. Stages of ADDIE Model Development

Stage	Main Activity	Instrument	Output
Analysis	Needs analysis, Kurikulum Merdeka, student characteristics, and potential of Bima folklore	Interview guide, needs analysis questionnaire	Needs analysis document, material concept map
Design	Designing the animation storyboard, PBL-based navigation flow, interface design, instrument grid	Storyboard, flowchart, interface prototype	12-scene storyboard, PBL navigation flowchart, UI design

Development	Animation production (Adobe Animate/Vyond), Bima-Indonesian dubbing recording, integration of interactivity	Expert validation questionnaire (5-point Likert scale)	Beta version animation media + validated research instruments
Implementation	Media trial on 30 seventh-grade students, 3 learning sessions, data collection	Pretest-posttest, character observation sheet, response questionnaire	Learning outcome data, character data, practicality data
Evaluation	Data analysis, product revision based on implementation findings, formative-summative evaluation	Evaluation checklist, reflection notes	Final validated interactive animation media product ready for publication

RESULTS AND DISCUSSION

A. Expert Validation Results

The validation process was conducted by four validators with a minimum academic qualification of a Doctorate and experience in their respective fields. Validation was carried out in two rounds (iterations) with product revisions between rounds until all validators stated that the media was feasible to be trialed. A complete recapitulation of the validation results is presented in Table 2.

Table 2. Recapitulation of Expert Validation Results

No	Validator	Aspect Assessed	%	Criteria
1	Media Expert (Prof. Ketut Agustini, M.Pd)	Technical quality, visuals, audio, and interactivity	92%	✓ Very Valid
2	Instructional Design Expert (Prof. Ni Nyoman Parwati, M.Pd)	Instructional design, PBL flow, media navigation	90%	✓ Very Valid
3	Content Expert (Dr. Khusnul Khotimah, MA)	Content accuracy, folklore relevance, character values	94%	✓ Very Valid
4	Instrument Expert (Dr. Syarifuddin, M.AppLing)	Item validity and research instrument reliability	91%	✓ Very Valid
	Overall Average		91.75%	✓ Very Valid

Figure 1. Bar Chart of Expert Validation Percentage Results (Media Expert 92%, Design Expert 90%, Content Expert 94%, Instrument Expert 91%)

Figure 1 above shows that all aspects of the interactive animation media validation obtained a Very Valid category with percentages above 90%. The highest score was obtained from the content expert at 94%, indicating that the content of the Bima folklore "La Bibano Putri Kalepe" and the integrated character values were presented accurately, relevantly, and in accordance

with the basic competencies of the Kurikulum Merdeka. The overall validation average of 91.75% proves that the product has met the academic feasibility standards to be trialed on the research subjects.

B. Pretest and Posttest Results (Media Effectiveness)

The effectiveness of the interactive animation media was measured by comparing the pretest and posttest scores given to 30 seventh-grade students at MTsN 5 Bima. The pretest was administered before the use of the media, while the posttest was administered after three learning sessions using the PBL-based interactive animation media. Complete data is presented in Table 3.

Table 3. Comparison of Student Pretest and Posttest Results

No	Indicator	Pretest	Posttest	Δ	Note
1	Class Average Score	62.00	87.00	+25.00	N-Gain: 0.66
2	Highest Score	75.00	98.00	+23.00	—
3	Lowest Score	45.00	72.00	+27.00	—
4	Students Reaching KKM (≥ 70)	8 students (27%)	28 students (93%)	+20 students	—
5	N-Gain Category	—	—	0.66	Moderate-High

The data in Table 3 show a very significant increase in the average score, from 62.00 in the pretest to 87.00 in the posttest, a difference of 25 points. The N-Gain value of 0.66 indicates that the improvement in learning outcomes falls into the moderate-high category according to Hake's criteria (1999). The percentage of students reaching the KKM (minimum mastery criterion, ≥ 70) increased dramatically from 27% (8 students) to 93% (28 students). This achievement proves that this PBL-based interactive animation media is effective in improving both the understanding of the material and students' digital literacy skills in a measurable way.

C. Student Character Assessment Results

Student character was measured through structured observation using a highly valid character assessment rubric ($r = 0.87$). Observations were conducted at the first meeting (baseline) and the third meeting (endline). The four dimensions of character measured, in accordance with the values contained in the story "La Bibano Putri Kalepe," are presented in Table 4.

Table 4. Results of Student Character Observation Before and After Implementation

No	Character Dimension	Baseline (%)	Endline (%)	Increase	Category
1	Responsibility	62%	90%	+28%	Very Good
2	Social Awareness	60%	88%	+28%	Very Good
3	Leadership	58%	89%	+31%	Very Good
4	Digital Ethics	55%	91%	+36%	Very Good
	Average	58.75%	89.50%	+30.75%	Very Good

Based on Table 4, all character dimensions experienced significant improvement, with an average increase of 30.75%. The largest increase occurred in the digital ethics dimension (from 55% to 91%, an increase of 36%), confirming that the digital literacy content explicitly integrated into each episode of the La Bibano story succeeded in raising students' awareness and ethical behavior in the digital world. The leadership dimension increased by 31%, reflecting the effectiveness of the character La Bibano as a contextual and relatable leadership role model for students.

D. Student Response to Media Practicality

Table 5. Results of the Student Response Questionnaire on the Interactive Animation Media

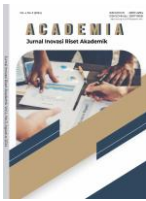
No	Practicality Aspect	Percentage	Category
1	Ease of use and media navigation	93%	Very Practical
2	Clarity of material presentation and animated story	92%	Very Practical
3	Visual and audio appeal of the La Bibano animation	95%	Very Practical
4	Relevance of the story to real-life character values	89%	Very Practical
5	Increase in student learning motivation and interest	91%	Very Practical
6	Contribution to digital literacy skills	90%	Very Practical
	Overall Average	91.67%	Very Practical

Table 5 presents the results of the analysis of the student response questionnaire on the practicality of using the interactive animation media in the school learning process. The quantitative data placed the visual and audio appeal of the La Bibano animation aspect in the highest position, reaching 95%. The ease-of-use and media-navigation indicator was in second place at 93%, followed by the clarity of material presentation at 92%. The story relevance aspect recorded the lowest result at 89%. Cumulatively, all these performance indicators produced an overall average of 91.67%, placing the learning media in the very practical category.

Discussion

The results of this development research comprehensively prove that the interactive animation media based on problem-based learning containing the Bima folklore entitled La Bibano Putri Kalepe has met the criteria for a valid, practical, and effective product (Tegeh et al., 2021). The validity of the product, shown by the average score of 91.75%, confirms that the media design has optimally implemented the basic principles of multimedia theory (Mayer, 2009). This visual usability aspect was designed by combining expressive moving visual elements, bilingual audio narration, translated text, and interactive reflective questions capable of reducing students' cognitive load in the classroom (Pramono & Wardani, 2023). In addition, the high validation score from the content expert, reaching 94%, specifically confirms that the integration of local content in this digital media was carried out with a high level of historical accuracy and deep pedagogical relevance (Zulkarnain et al., 2022). The alignment of all these instructional elements ensures that the process of knowledge transfer can proceed very efficiently and meaningfully for all the junior high school students who were the main subjects of this field experimental research (Miluningtias & Shofiyah, 2021; Prihatini & Sugiarti, 2022; Syahrizal et al., 2024).

Second, the effectiveness score of the product in the form of an N-gain score of 0.66, which falls into the moderate-to-high category, is in line with previous meta-analysis results (Susanto et al., 2022). That study concluded that the application of digital-device-assisted problem-based learning strategies consistently produces scores between 0.50 and 0.75 among junior high school students in Indonesia. The neatly structured steps in this system help students construct knowledge constructively and independently through solving real conflicts (Arends, 2012; Fatimah & Ramdani, 2023). This flow begins with problem orientation through a folklore excerpt and proceeds to the stage of virtual group learning-outcome presentation. The real impact of this active involvement is reflected in the sharp increase in the percentage of classical

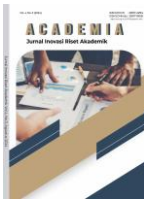


learning completion, which rose dramatically from an initial condition of only 27% to 93% by the end of the intervention session. This quantitative achievement data serves as strong evidence that the use of this interactive media is able to inclusively and evenly accommodate the diversity of students' learning styles in supporting the achievement of the national curriculum's instructional goals currently being implemented by teachers in their classrooms (Khatimah et al., 2025; Kurniawati & Putri, 2023; Nadhiroh & Ahmadi, 2024).

Third, the significant improvement in the digital ethics aspect, from an initial condition of 55% to 91% — an increase of 36% — provides valid empirical evidence. This finding confirms that integrating local folklore into digital learning media is a highly effective strategy for shaping superior character in the new era. The alignment of traditional literary material is considered to contain a philosophical value system that can serve as a solid foundation for contextual moral education (Zulkarnain et al., 2022). The characters in this classic narrative display exemplary leadership character, personal responsibility, and social awareness that are very familiar to students' daily cultural lives. Through this cultural closeness, the figure acts as a real role model that is very easy for students to internalize into their moral awareness (Safitri et al., 2022). Thus, local content is no longer viewed merely as a legacy of past culture but is transformed into a functional ethical education instrument for the emotional development of the younger generation in warding off the various negative influences of the increasingly massive wave of technological modernization in today's digital society (Huges & Nurjaman, 2022; Mahmudi, 2024).

Fourth, the escalation of students' digital literacy capacity, reflected in the improvement of final exam scores and the expansion of the digital ethics dimension, is highly aligned with the international digital competence framework (Yudha et al., 2023). This framework covers five main competency areas, including data management, collaborative communication, creative content creation, security protection, and technical problem-solving. The series of problem-based instructional activities packaged in this media forced students to actively search for, critically evaluate, and apply new information to solve the contextual problems presented throughout the traditional Bima storyline. This cognitive stimulation process proved successful in holistically and evenly training all five of these basic competency pillars for students (Nuraini & Hidayat, 2023). Active involvement in the virtual learning space trained students' independence to not only act as passive consumers of digital information but also to develop into wise, responsible content producers with good legal awareness while surfing the internet to complete the various structured tasks assigned by the school curriculum during their orientation period in the new classroom (Armawi & Wahidin, 2020; Rizal et al., 2020).

Overall, the findings of this research provide an original scholarly contribution in the form of a formulated integration of three main learning pillars: the sophistication of digital technology, the depth of innovative pedagogical strategy, and the preservation of local wisdom values. The unification of these three aspects produces a single interactive teaching device that is empirically valid and applicable for use in learning activities. This model design can be positioned as an operational blueprint for educational media developers in other regions who wish to optimize their local traditional literary wealth to produce authentic character education tools. However, this development research has a limitation in the form of a product trial scope still limited to one specific cultural target region. Its theoretical implications encourage the importance of conducting further research in the form of large-scale comparative experimental studies to test the consistency of this media's effectiveness across various heterogeneous school ecosystems, in order to create an inclusive, adaptive, and equitable digital character education



system for the future of all national students, so that they can grow into resilient individuals with noble morals and highly proficient technological skills for this century.

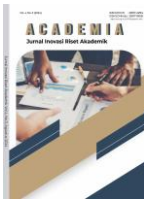
CONCLUSION

This study concludes that the development of interactive animation media based on problem-based learning that integrates Bima folklore has proven to be valid, practical, and effective in improving character values as well as the digital literacy skills of junior high school students. The integration of local wisdom provides a meaningful context for the moral internalization process of values such as responsibility, leadership, social awareness, and digital ethics in a natural way. The problem-based learning syntax within the multimedia flow succeeded in reducing students' cognitive load and stimulating their critical thinking skills. Through a dynamic virtual learning space, this instructional media is able to transform monotonous conventional teaching patterns into student-centered independent interactive exploration. The unification of digital technology, innovative pedagogical strategy, and the preservation of traditional culture successfully produced a contextual alternative teaching tool to shape a new generation with strong character, resilience, noble morals, and broad, comprehensive, balanced, and sustainable technological proficiency.

For future research development, subsequent researchers are advised to apply a true experimental design with a mixed-methods approach to test the effectiveness of interactive media more comprehensively. Future research exploration needs to expand the scope of the sample area across different schools and socio-geographic regions to increase the degree of product generalization. Subsequent researchers are encouraged to include a balanced external control group as an original comparison and to explore a variety of other traditional folklore rich in historical value. Conditioning observations through structured longitudinal studies is highly recommended to track the stability of character resilience and the consistency of students' digital literacy over time. Future research can also integrate new technologies such as artificial intelligence and adaptive learning so that the storyline visualization becomes increasingly personalized, adaptive, innovative, engaging, and responsive to students' independent learning needs in a broad, comprehensive, balanced, and highly optimal way.

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