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Development of Interactive Worksheets with Artificial Intelligence for Students Based on Bojonegoro Local Wisdom Towards Literacy Skills of Madrasah Ibtidaiyah Students

Pengembangan LKPD Interaktif *Artificial Intelligence* Berbasis *Local Wisdom* Bojonegoro Pada Kemampuan Literasi Siswa Madrasah Ibtidaiyah

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Abstract
This study aims to develop interactive student worksheets (LKPD) based on Artificial Intelligence (AI) that integrate Bojonegoro's local wisdom to improve literacy skills among Madrasah Ibtidaiyah (MI) students. These worksheets are designed to utilize AI technology in delivering engaging and contextual learning materials that reflect cultural values and local wisdom. The research employed a Research and Development (R&D) methodology using the ADDIE model (Analysis, Design, Development, Implementation, Evaluation). Results showed a 94% validation score, classifying the AI-based interactive LKPD as excellent and ready for use without revision. The worksheets effectively enhanced students' literacy—especially in understanding and appreciating local content—demonstrated by an N-Gain score of 0.7–0.8 (high category). The classical learning mastery rate reached 93–95%, indicating that the majority of students achieved the set competency standards. Both teachers and students responded positively to the interactive and user-friendly design. Consequently, the AI-based LKPD presents a viable alternative as an innovative learning medium that supports literacy development while preserving Bojonegoro's cultural heritage.
Keywords: *Worksheets Interactive Learners, Artificial Intelligence, Local Wisdom Bojonegoro, Literacy, Madrasah Ibtidaiyah.*

Abstrak
Penelitian ini bertujuan untuk mengembangkan Lembar Kerja Peserta Didik (LKPD) Interaktif berbasis Artificial Intelligence (AI) yang mengintegrasikan kearifan lokal Bojonegoro untuk meningkatkan kemampuan literasi siswa Madrasah Ibtidaiyah. LKPD interaktif ini dirancang untuk memanfaatkan teknologi AI dalam menyajikan materi pembelajaran yang menarik dan kontekstual, dengan mengangkat nilai-nilai budaya dan kearifan lokal Bojonegoro. Metode penelitian yang digunakan adalah Research and Development (R&D) dengan model pengembangan ADDIE (Analysis, Design, Development, Implementation, Evaluation). Hasil penelitian menunjukkan bahwa LKPD interaktif berbasis AI ini memiliki hasil validasi sebesar 94% atau berada pada kategori sangat baik dan layak untuk digunakan tanpa revisi. LKPD juga efektif dalam meningkatkan kemampuan literasi siswa, khususnya dalam memahami dan mengapresiasi konten lokal dapat meningkatkan hasil tes siswa dengan N-Gain sebesar 0,7-0,8 yang termasuk dalam kategori tinggi. Tingkat ketuntasan belajar klasikal mencapai 93-95%, menunjukkan bahwa mayoritas siswa dapat mencapai standar kompetensi yang ditetapkan dan dapat meningkatkan literasi siswa. Selain itu, LKPD ini juga mendapat respon positif dari guru dan siswa karena desainnya yang interaktif dan mudah digunakan. Dengan demikian, LKPD interaktif berbasis AI ini dapat menjadi alternatif media pembelajaran inovatif yang mendukung penguatan literasi siswa Madrasah Ibtidaiyah sekaligus melestarikan kearifan lokal Bojonegoro.
***Kata Kunci**: LKPD Interaktif, Artificial Intelligence, Kearifan Lokal Bojonegoro, Literasi, Madrasah Ibtidaiyah.*

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INTRODUCTION

Education in the digital era has undergone a significant transformation with the development of technology (Firmansyah & Saepuloh, 2022). The development of information and communication has opened an opportunity in the world of education to create learning media that is more innovative and interactive. Artificial Intelligence is one of the digital based approaches rapidly growing in opportunity. AI technology made it possible in adapting learning media that meets student needs, give real time feedback, and nurture a learning experience that is more personal and effective (Jiménez et al., 2021; Kong, 2020; Lin et al., 2021; Maufidhoh & Maghfirah, 2023; Rahadiantino, 2022; Zahara et al., 2023). In this context, developing student worksheets (LKDP) with AI basis may be the potential solution to improve student literacy, specifically at religious elementary schools (MI).

MI student literacy skill in Indonesia persists to be an ongoing challenge as it was reported in several national and international studies (Handayani, 2020; Membaca, 2019; Nudiati & Sudiapermana, 2020). The Survey Program for International Student Assessment (PISA) showed that Indonesia is still ranked low in national reading literacy compared to other nations (11). This issue is also found by various local researches; inferring how low the local reading interest and literacy skill are (Miftah et al., 2022; Suttrisno, Fitria Nely Elmuna, 2024). Therefore, an innovation is needed to effectively increase student motivation and literacy skills.

On the other hand, local wisdom has an important role in education, especially in building character and cultural identity. Local wisdom reflects traditional values passed down by the community, marking it as an educational source that is contextual and relevant (Pingge, 2017; Rummar, 2022). In the context of Bojonegoro region, there are many cultural and traditional values that can be integrated into learning, ie. folk stories, traditional art, and local philosophy (F. Z. R. Suttrisno, 2023; Suttrisno, S., Riyanto, Y., & Subroto, 2020). Unfortunately, local wisdom in material learning is not yet optimal, causing students to lack culture based education.

AI integration in interactive student worksheets based on Bojonegoro local wisdom is expected to solve the challenges in increasing MI student literacy. AI

technology may be able to develop student worksheets that are adaptive with a system that can situate itself with any student level. Other than that, interactive features such as educative chatbot, reading recommendations, and automatic evaluation may give an interesting and effective learning experience (Srinivasan, 2022; Sujana et al., 2023). Therefore, AI integrated interactive student worksheet might be the innovative solution in handling the problem of low MI student literacy.

The implementation of technology in learning is also in line with the national education mandate which emphasizes the importance of digitization in learning processes. The Ministry of Education, Culture, Research and Technology (Kemendikbudristek) have developed many school digitization initiatives, including technological reinforcements in the curriculum and digital based assessments (Kemendikbudristek, 2021). Therefore, the development of AI integrated interactive student worksheet based on Bojonegoro local wisdom will be a strategic step in supporting the national education regulation.

Other than the technological aspect and the regulation, the development of learning media with AI basis also has a significant pedagogical benefit. According to constructivism theory, students are more effective in learning when they are directly and actively involved in the learning process (Tomela, 2018). The use of AI in interactive student worksheet is a viable learning experience that is more in depth through direct interaction with an adaptive learning system. Other than that, constructivism theory also supports technological usage in learning because it enables students to access information in a broader yet structured way (Harahap et al., 2023; Siemens, 2004).

After assessing the aforementioned aspects, this study aims to develop an interactive student worksheet with AI integration that is based on Bojonegoro local wisdom with the goal of increasing MI student literacy. The main focus of this study is to design an AI integrated interactive student worksheet based on Bojonegoro local wisdom, and is also able to adapt the learning material with student needs, increase participation in the learning process, and enrich student knowledge on local culture. With this approach, this study is expected to contribute in increasing learning literacy on a basic level in a meaningful way.

The main contribution of the study lies in the innovation of the student worksheet in integrating AI technology and local wisdom in one platform. In implementing the

ADDIE model (Analysis, Design, Development, Implementation, Evaluation), this research will produce an interactive student worksheet whose effectiveness will be tested in increasing MI student literacy. Other than that, this study will be able to give some recommendations to education authorities in adopting technology based learning media in MI schools in Bojonegoro and Indonesia as a whole.

With this novelty, this research will not only give significant academic contribution, but also increase student literacy contextually and with the basis of modern technology. The longitudinal study to assess the long term effect of AI integrated student worksheet towards academic performance and cultural understanding needs to be conducted in order to give strong evidence in favor of the effectiveness of this research. The comparative research between various AI integrated models in learning and their effects towards different learning outcomes will be a valuable insight in developing better education technology.

Earlier studies have proven that the use of technology in learning is able to increase student effectiveness, even before integrating AI and local wisdom. Previous studies have found that digital media in literacy learning increased student comprehension up to 30% compared with conventional methods (Ginting, 2021; Hidayat & Khotimah, 2019; N. M. Y. Suttrisno, 2024; Zulqadri & Nurgiyantoro, 2023). Other opinions have also stated that AI integration in learning can increase student participation in learning processes (Kong, 2020; Maufidhoh & Maghfirah, 2023; Pardamean et al., 2022). Therefore, this study will broaden the research regarding the development of student worksheets with the basis of AI and contextualized with the local values of Bojonegoro.

This study is meant to fill the gap in AI implementation in learning research. Teachers and students have experienced difficulties with the lack of reference in AI based student worksheets. The observation data showed that around 80% of teachers have not yet been able to maximize the development of technology such as AI and combine it with local cultural learning (Suttrisno, 2025; N. M. Y. Suttrisno, 2024; Yulia & Suttrisno, 2024). The lack of student literacy also reached up to 75%. To clarify, these issues will be the main focus of the study: 1) How to develop student worksheets with AI integration based on Bojonegoro local wisdom that is effective in improving elementary student literacy; 2) How the results of the student worksheets development will be effective in improving elementary student literacy.

RESEARCH METHODS

The ADDIE model was used for this project, the steps being Analysis, Design, Development, Implementation, and Evaluation (Yulia et al., 2023). The development process can be seen in Tabel 1.

Tabel 1. Research Stages

Stages	Proceedings		Goals	Role
	Activity	Description		
Pre Research	Analysis	Needs Analysis (Curriculum)	Learning outcomes will be studied suitably.	Leader
		Target User Analysis (Students)	Student target in accordance with Merdeka Curriculum.	Leader
		Materials Analysis	Learning materials based on the integration of local wisdom	Leader
		Proposal Review	Final Proposal	Leader
	Design	Set up Learning Goals	Goal of learning	Leader and member
		Set up Learning Syntax	Lesson Plan	Leader and member
		Set up the product's prototype	Designing the interactive student worksheet based on Bojonegoro local wisdom	Leader and member
	Development	Developing the content of interactive student worksheets with AI integration based on Bojonegoro Local Wisdoms	Student worksheet content with AI based on local wisdom	Leader and member
		Developing student worksheet based on local wisdom	Interactive student worksheet with AI based on local wisdom	Leader and member
		Developing the student worksheet	Student worksheet content	Leader and member
		Developing the student worksheet with suitable visuals	Design, Infographic and Images	Leader and member
	Implementation	Expert Validation	Validation results followed with product revision	Leader and member
		Field Validation		
	Evaluation	Module effectiveness in learning test	The effectiveness of the student worksheet	Leader and member
		Content Revision	Final product	Leader and member
		Language Revision		
		Visuals Revision		
Post Research	Reports	Writing Final Report	Final report	Leader and member
		Writing the Journal article	Article that will be published with the accreditation of Sinta 1-6	Leader and member

For further information, read Tabel 1 as follows:

1. Pre-Research

Pre-research was conducted by analyzing the curriculum, student needs, and materials.

1) Analysis

This analysis activity is carried out during the initial observation at the pre-research stage. This activity is carried out by analyzing the curriculum, student needs, and materials (Eka Margareta Sinaga, Salamun, Suttrisno, Azis, M. Rusli B, Sugeng Pramudibyo, Habib Zainuri, Maya Nurlita, Fitria Meisarah, Sri Ayu Ashari, Endi Zunaedy Pasaribu, Wiwin R Kunusa, 2023). The points analyzed in this stage are as follows:

a. Curriculum Analysis: This needs analysis includes an analysis of the curriculum targets to be achieved through the development of this instrument. Both related to students' initial abilities and objectives in local wisdom-based learning.
b. Student Needs Analysis: In addition to analyzing curriculum achievements in learning, researchers also analyzed students' needs related to the existence of the student worksheet, both in terms of adjustments to students' language, cognitive, and psychological development as well as student literacy.
c. Material Analysis: In making an instrument, it certainly needs to be adjusted to the material to be measured. In addition, the material is also selected and connected to AI and the Local Wisdom that is developing around it in Bojonegoro. So the instrument developer is required to carry out material analysis activities, to prepare the development of the Artificial Intelligence Interactive student worksheet based on Local Wisdom in Bojonegoro.

2. Research

2) Design

The next stage is the development design which is carried out during the research process. This stage is done by designing the student worksheet with several stages including (Agus, 2018):

a. Interactive Student Worksheet Concept Design: The first step is to design by compiling a digital student worksheet structure that includes material based on Bojonegoro local wisdom, adaptive practice questions, and interactive AI features.
b. Selection of Digital Platforms and AI Technology: This is from the analysis activities and the integration of previous objectives. Then the technology and

software to be used are selected, for example Google Dialogflow for chatbots, speech-to-text API, and machine learning for material recommendations. Then design an attractive user interface (UI) that is easy for MI students to use so as to improve literacy.

c. Making an Interactive Student Worksheet Blueprint: Designing the initial appearance of the student worksheet by considering the layout of text, images, interactive videos, and integration of AI features. In addition, determining the navigation system and gamification elements to increase student participation in learning, which ultimately supports increased literacy.

3) Development

The third stage is to develop an interactive AI-integrated student worksheet based on Bojonegoro local wisdom. This development includes:

a. Developing Student Worksheet Content: The content of AI-integrated interactive Student Worksheet based on local wisdom will be developed by highlighting scientific materials and typologies of community beliefs that refer to various sources so that it will be able to provide students with a complete understanding of the concept as a provision for developing AI interactive Student Worksheet based on local wisdom so as to increase literacy.

b. Developing AI Technology in Student Worksheet: After the instrument is composed, the next step is to develop capabilities that can become an interactive AI-integrated Student Worksheet based on local wisdom.

c. Developing Student Worksheet Visualization: Next is the Student Worksheet layout. Including developing the visualizations needed. This is certainly done based on mapping the analysis of student needs, both psychologically, physically, visually, cognitively, and linguistically. This assessment will be developed in order to encourage intelligent students by having literacy skills.

4) Implementation

This implementation is done through validation of the Artificial Intelligence Interactive Student Worksheet based on local wisdom that has been developed. This product is validated by experts in the fields of language, materials, and media. (Iwan Hermawan, 2019). After the validation process, researchers will revise the product according to the direction and input from experts.

5) Evaluation

a. Testing the effectiveness of the AI-integrated interactive Student Worksheet based on local wisdom that had been developed.

After the product passes the validation stage, the Student Worksheet product will then be implemented in educational institutions, especially in elementary schools in the Bojonegoro area, to measure students' literacy skills.

b. Product Revision

The final stage is to revise the product based on the results of the AI interactive Student Worksheet effectiveness test based on local wisdom and also suggestions and input from students, teachers, and schools.

3. Post Research

After the research stages are completed, the researcher will report by creating a research report and also creating an article which will then be published in an accredited journal with sinta 1-6.

a) The Subject and Object of Research

This research will be conducted in 5 elementary education institutions in the Bojonegoro area. The research will be implemented on fourth grade students. The educational institutions will be implemented in:

1. *MINU Unggulan* in Bojonegoro
2. *MINU Unggulan* in Sumberejo Bojonegoro
3. *MI Islamiyah* in Ngasem Bojonegoro
4. *MI Islamiyah Balen* in Bojonegoro

b) Types and Sources of Data

This study uses qualitative and quantitative data. Qualitative data were obtained through questionnaires and interviews in the form of suggestions, comments, and criticisms from experts involved in the validation of the AI interactive Student Worksheet based on local wisdom, including language experts, material experts, and media experts. Meanwhile, quantitative data were obtained from the results of questionnaires filled out by these experts, as well as by teachers and students through tests.

c) Data Collection Technique

In collecting research data, the techniques used were interviews and validation test questionnaires and field trial questionnaires. This interview was conducted by giving several question points to the resource person based on the interview instrument

conducted using the deep interview technique. This interview was conducted with teachers and students.

The feasibility of the AI-integrated interactive LKPD based on local wisdom that has been developed was tested by providing questionnaires to language, material and media experts (Sugiyono, 2017). In addition, a questionnaire was also given to teachers to get a feasibility test of the AI-integrated interactive Student Worksheet based on local wisdom. Based on the questionnaire, the product will be revised and then tested in 5 educational institutions under the auspices of the Ministry of Religion to determine the level of effectiveness of the product that has been developed. To measure the level of student literacy, a test instrument is used.

d) Data Analysis Technique

Qualitative data analysis was carried out through three main stages, namely data reduction, data presentation, and drawing conclusions. Qualitative data that has been collected will be reduced by selecting the suitability between the data and the desired product specifications. The data then would be presented in the form of a table to facilitate understanding and analysis. The conclusion stage would be based on the data that has been presented (Riyanto, 2017).

Quantitative data from the results of the feasibility test questionnaire are calculated by applying the following formula:

$$Percentage\ of\ eligibility = \frac{score\ obtained}{maximum\ score}$$

After that, the average score is calculated using the formula:

$$Mean\ Score = \frac{Total\ Score}{Number\ of\ Subject}$$

The percentages obtained are then interpreted based on the criteria listed in Table 2.

Table 2. Interpretation Criteria

Percentage	Interpretation
81-100%	Very Worthy
61-80%	Worthy
41-60%	Quite Worthy
21-40%	Less Worthy
1-20%	Very Less Worthwhile

RESULTS AND DISCUSSION

Development of AI-based interactive Student Worksheet using the ADDIE development model (Analysis, Design, Development, Implementation, Evaluation) which has been proven effective in developing digital learning media. The analysis stage includes identifying student needs, curriculum analysis, and mapping local wisdom of Bojonegoro that is relevant to learning materials. This analysis process also includes a study of the characteristics of MI students and the technological infrastructure available at the school.

In the pre-research stage, curriculum analysis, student needs, and materials were crucial initial steps in developing a Student Worksheet based on local wisdom of Bojonegoro. Curriculum analysis aims to understand the learning targets to be achieved, especially in the context of student literacy skills which are very necessary in the Merdeka Curriculum (Merdeka Belajar). This is in line with the opinion of the Minister of Education and Culture Regulation Number 22 of 2016 (Permendikbud Nomor 22 Tahun 2016) concerning educational process standards which emphasize the importance of critical and creative thinking skills among students.

Student needs analysis was also carried out to ensure that the LKPD developed is in accordance with their language, cognitive, and psychological development. The study by (Subekti & Suparman, 2020) shows that understanding students' needs is very important to improve learning effectiveness. By knowing the characteristics and needs of students, this development can design a Student Worksheet that is more relevant and applicable.

Material analysis is the third step in pre-research. It is important to ensure that the content measured in the evaluation instrument is closely related to the local wisdom that exists in the student's environment. According to (Rosyidah & Atmojo, n.d.), integration of local culture in learning not only enriches students' learning experience but also makes learning more meaningful. Therefore, material analysis focuses on selecting materials that are appropriate and relevant to the local wisdom context.

Based on the analysis stage, the results showed that the level of students' literacy skills is still relatively low, this is because the media commonly used by teachers in learning activities is still in the form of conventional evaluation tools with paper and using textbook references so that it does not improve students' cultural literacy. Therefore, there needs to be a better and contextual evaluation tool to be applied in

learning activities (Suttrisno, 2021). This is the background for researchers to develop Student Worksheets based on local wisdom of Bojonegoro in the subject of Science and Social Studies in the fourth grade class MINU Unggulan, MI Ulul Albab, MINU ICP, MI Al Hidayah, and MI Islamiyah Balen in Bojonegoro.

The design and development stage focuses on designing a user-friendly interface and integrating AI algorithms that are in line with learning objectives. Content development is carried out by considering the principles of instructional design and the characteristics of technology-based learning. Implementation involves limited trials and revisions based on feedback from expert validators of material, media, and education practitioners. Here are some of the results of the design and development of LKPD:

Figure 1. Student Worksheets Design Activity 1

Figure 2. Student Worksheets Design Activity 2

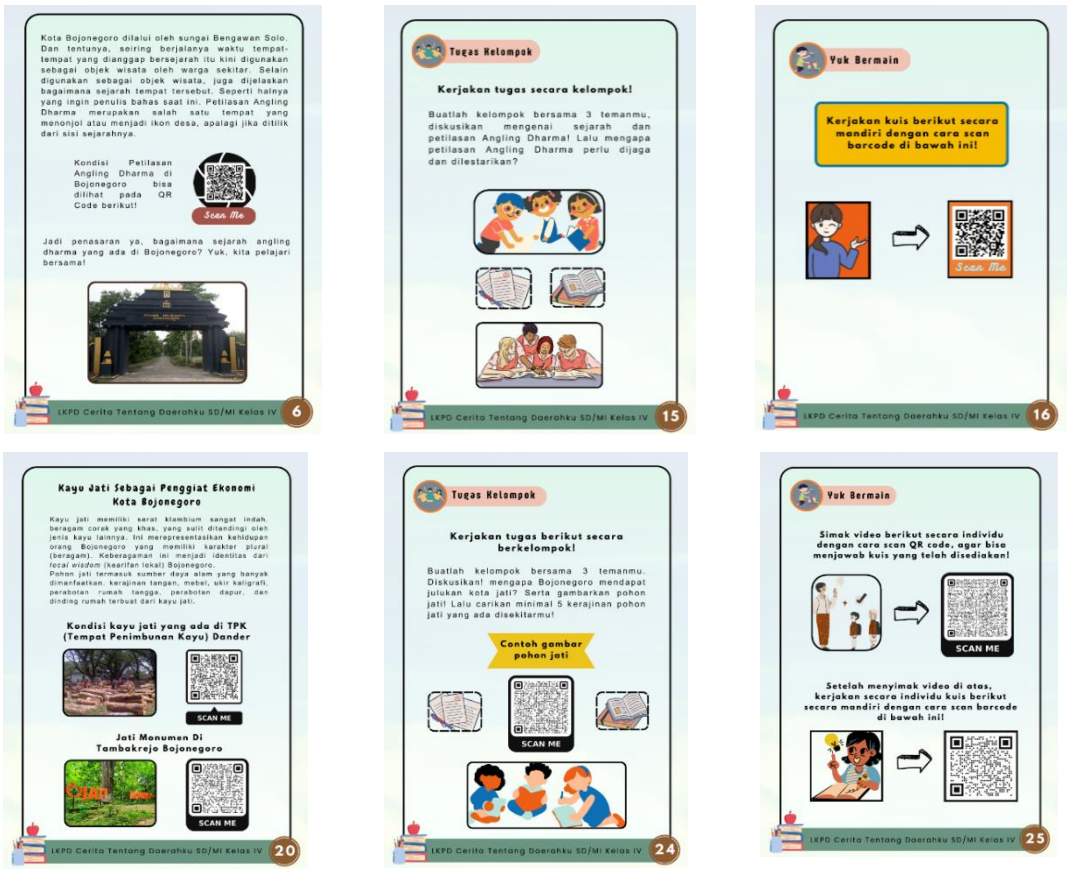

Figure 3. Student Worksheets Design Activity 3

At this Implementation stage, a Validation Test was conducted on the Expert validator, this validation test was conducted by 3 validators, namely the Instrument/Question Validator, Media/Display Validator, and Language/Culture Validator. In this validation, the results obtained can be concluded as follows:

Tabel 2. Validation Results by expert validators

No	Validation Types	Percentage	Category	Description
1	Media Validation	96%	Very Good	Suitable for use without revision
2	Instrument Validation	93%	Very Good	Suitable for use without revision
3	Language and Culture Validation	94%	Very Good	Suitable for use without revision

Based on the validation results, it can be seen that the validation of the Interactive Artificial Intelligence Student Worksheet Based on Local Wisdom Bojonegoro on Literacy Skills overall obtained a percentage above 94% or was in the very good category and was suitable for use without revision.

Figure 4. Documentation of implementation of evaluation tools in class

The Interactive Student Worksheet that has been validated and is suitable for use in the field was then tested on students of fourth grade classes of MINU Unggulan, MI Ulul Albab, MINU ICP, MI Al Hidayah, and MI Islamiyah Balen in Bojonegoro. During learning activities, students tend to be more enthusiastic about learning activities because of the new evaluation tools used in learning activities. Where the evaluation tools can be operated by students independently and interactively using their respective smartphones. The evaluation tool instruments used are also considered quite difficult for students to work on, as evidenced by the results of students' work on questions where in the questions in the moderate and difficult categories that have been developed, many students answered incorrectly on each question.

Student Worksheet Validity and Reliability

Validation of AI-based interactive Student Worksheet was carried out through assessments from material experts, media experts, and educational technology experts. The validation results showed that the developed worksheets had a high level of validity with a percentage of material expert validation reaching 95-97%, media expert validation 88-96%, and language expert validation 95-96%. Validity criteria include aspects of material suitability to the curriculum, interface design quality, and the effectiveness of AI technology integration.

The reliability of Student Worksheet was tested through the consistency of the results of use in various learning conditions and different student groups. The reliability test showed that LKPD has a good level of consistency in providing optimal learning outcomes. The use of adaptive AI algorithms ensured that the Student Worksheet can provide a consistent yet personal learning experience for each student.

Practicality and Ease of Use

The practicality aspect of AI-based interactive Student Worksheet was measured through teacher and student responses to the ease of use of learning media. The results of the practicality test showed a positive response from teachers with a percentage of 90-96% and student responses with a percentage of 83-92%. Factors that influence practicality include ease of navigation, suitability to students' technological abilities, and seamless integration with the learning process in the classroom.

The Student Worksheet interface was designed by considering the cognitive characteristics of MI students who require attractive visuals and clear instructions. The use of gamification and interactive elements made students more engaged in the learning process (Maryo & Pujiastuti, 2022).The integrated help and tutorial system in the Student Worksheet makes it easier for teachers and students to use the available AI features.

Evaluation as the final stage included testing the effectiveness of the instrument in the field and revisions based on the results of the trial. Effective evaluation not only measures results, but also provides feedback for continuous improvement. In this study, data were collected from five elementary education institutions in Bojonegoro to evaluate the extent to which the instrument can be used practically. Quantitative and qualitative data analysis was carried out to provide a more holistic picture of the effectiveness of the instrument.

The effectiveness of AI-based interactive LKPD is measured through the improvement of student learning outcomes and the completion of learning objectives. Research shows that the use of AI-based Student Worksheet can improve student test results with an N-Gain of 0.7-0.8 which is included in the high category. The classical learning completion rate reaches 93-95%, indicating that the majority of students can achieve the set competency standards and can improve student literacy.

The implementation of Interactive Artificial Intelligence Student Worksheet Based on Local Wisdom Bojonegoro on Literacy Skills in this learning can improve Literacy and student activities than conventional evaluation tools made by teachers with reference to textbooks in learning activities and handwritten. This is in accordance with the results of the student and teacher response questionnaires that have been presented in Table 4.11 and Table 4.12 which obtained the results that Interactive Artificial Intelligence Student Worksheet Based on Local Wisdom Bojonegoro on Literacy Skills can improve student learning activities and student interest in working on evaluation tools. From the student

questionnaire data which was then analyzed using a reliability test, it can be seen that the Evaluation Tool Instrument developed by researchers is reliable as seen in the following table:

Tabel 4.16 Reliability Test Result

Crinbach's Alpha	N of Items
876	15

It can be seen that the Cronbach's Alpha value is 0.876 or >0.6 so that the data can be said to be reliable, and can be disseminated in the dissemination stage. At the dissemination stage or dissemination of the Interactive LKPD that has been developed. In this study, only limited dissemination was carried out, namely by disseminating the Interactive LKPD Instrument to teachers at MINU Unggulan, MI Ulul Albab, MINU ICP, MI Al Hidayah, and MI Islamiyah Balen in Bojonegoro.

Learning with interactive Student Worksheets has also been proven to increase student motivation and engagement in the learning process. Students show higher enthusiasm and more active participation in learning activities. AI features that provide instant feedback and difficulty level adjustments help students feel more confident and motivated to continue learning (Murti & Handayani, 2022).

AI-based interactive Student Worksheet developed in line with the implementation of the Merdeka Curriculum which emphasizes project-based learning and student character development. The integration of Bojonegoro local wisdom in Student Worksheet supports the implementation of the Pancasila Student Profile Strengthening Project (Projek Penguatan Profil Pelajar Pancasila/P5) which prioritizes contextual learning. This approach allows students to develop 21st century competencies while maintaining local cultural values.

The flexibility of AI-based Student Worksheet allows teachers to adapt learning to the needs and characteristics of students in accordance with the principles of differentiated learning in the Merdeka Curriculum (Nugrohadi & Anwar, 2022). Integrated analytics systems assist teachers in conducting formative assessments and providing constructive feedback to students (Putri, 2022).

The implementation of AI-based interactive Student Worksheet in MI schools faced several challenges, especially related to the limitations of technological infrastructure and teachers' digital competence. Not all madrasahs have adequate

internet facilities and sufficient computer/tablet devices to support AI-based learning. The disparity in technology access between madrasahs in urban and rural areas is an obstacle to equitable implementation.

Resistance to change from traditional learning methods is also a challenge that needs to be overcome through intensive training and mentoring. Teachers need time to adapt to understand and optimally utilize AI features in the Student Worksheet (Inceoglu, 2022). The lack of understanding of AI technology among educators requires systematic efforts in developing the capacity of educational human resources.

Sustainable development of AI-based interactive Student Worksheet requires a comprehensive strategy covering aspects of technology, pedagogy, and policy. Increasing teacher capacity through continuous training on the use of AI in learning is a top priority. Training programs need to be designed systematically with a hands-on and mentoring approach to ensure effective knowledge transfer (Septiana & Hanafi, 2022).

Collaboration between technology developers, education practitioners, and policy makers is needed to create a learning ecosystem that supports the implementation of AI in schools. The development of a digitalized local wisdom content repository can be a valuable resource for the development of similar Student Worksheets in other regions. Continuous evaluation and improvement based on usage analytics data will ensure that Student Worksheets remain relevant and effective.

Theoretically, the development of interactive AI-based Student Worksheets with the integration of local wisdom contributes to the theory of constructivist learning and contextual learning. This study shows that the combination of AI technology with local cultural content can increase the meaningfulness of learning and student retention rates. The resulting development model can be a framework for the development of similar learning media in different cultural contexts.

In practice, this study provides concrete solutions to improve the quality of learning in Madrasah Ibtidaiyah through the use of leading technology that maintains local cultural values. The developed Student Worksheets can be a best practice model for replication in other schools with adaptations according to the local wisdom of each region. The results of this study also provide valuable input for policy makers in formulating a digitalization strategy for education that supports the preservation of local culture.

Based on the research results, it is recommended to develop AI-based interactive Student Worksheets for other subjects with broader integration of local wisdom. Further research can explore the use of more sophisticated AI technologies such as Natural Language Processing and Machine Learning to provide a more personalized and adaptive learning experience. The development of a collaborative learning platform that allows students from various regions to interact and share their respective local wisdom is also an interesting research area.

Artificial Intelligence-based Student Worksheet has proven to be more effective than non-AI digital LKPD because of its ability to provide real-time adaptive feedback, adjusting the material to the learning needs of each student. (Sopani et al., 2024). While non-AI digital Student Worksheet is only static and general for all users, AI LKPD is able to analyze student answer patterns and automatically suggest appropriate enrichment or remedial materials. (Subekti & Suparman, 2020). Thus, AI not only facilitates more personalized and efficient learning, but also increases student motivation and engagement due to its responsive and interactive approach, making it a significant added value in the context of 21st century learning.

Previous research shows various efforts in developing AI learning and integrating local wisdom in the context of education. (Anggraeni, 2020; Rahman et al., 2024; Roesmawati et al., 2022; Sukrin & Ihlas, 2024). However, research that specifically considers Local Wisdom Bojonegoro as a basis for developing AI learning in elementary schools is still limited. Focusing on digital literacy skills and local wisdom in developing AI-integrated Student Worksheet based on Local Wisdom Bojonegoro is also a significant novelty.

In several previous studies, evaluations that integrated local wisdom were able to develop literacy skills that were in accordance with 21st Century Skills in students (Sawitri et al., 2019). This is because it involves linking to concrete situations in the environment, helping students understand the concept of 21st Century Skills based on the context of their environment (Alawia, 2019; Mashudi, 2021). This process also allows students to apply the concept of 21st Century Skills in interactions with their surrounding environment, linking learning materials to the real conditions of the surrounding community, and using everyday life experiences to make decisions based on the situations they face (Permana, 2017).

Through this approach, there is a continuation between the understanding of knowledge obtained through the integration of scientific attitudes rooted in local wisdom values. Students not only understand theories, but are also able to relate them to the reality around them (Fadli, 2020). This helps to create relevant and applicable skills in problem solving, decision making and interaction with the surrounding environment (Aka et al., 2023). The integrity between local wisdom and literacy skills in accordance with 21st Century Skills becomes more apparent through this approach (Pornpimon et al., 2014).

This study presents an innovative concept in the development of AI learning materials by utilizing Local Wisdom Bojonegoro. Through a development approach that produces relevant, interesting, and enriching Student Worksheets. In addition, the process of developing this Student Worksheet also involves experts, as this is one of the added values that attracts attention in the context of local wisdom-based education. It is expected that this study can provide a significant contribution to the development of sustainable education that is relevant to the social, cultural, and local context of MI students in Bojonegoro. The innovation in this study lies in the development of Interactive Artificial Intelligence Student Worksheets based on Local Wisdom Bojonegoro on MI Students' Literacy Skills.

Based on the results of the synthesis and research conducted by researchers on the study of the development of Interactive Artificial Intelligence Student Worksheets based on Bojonegoro Local Wisdom, new innovations are needed in the development of this approach. It is very necessary to develop an interactive Student Worksheets for in the independent curriculum with Artificial Intelligence based on Bojonegoro Local Wisdom. The development of Artificial Intelligence based on Bojonegoro Local Wisdom in the Merdeka curriculum has not been widely developed.

Compared to previous studies, the development of interactive Student Worksheets based on Artificial Intelligence (AI) with local wisdom Bojonegoro offers several advantages: 1) Integration of AI in Literacy Learning which is different from previous studies that only use static print or digital media, this study utilizes AI to provide automatic feedback, learning personalization, and analysis of student literacy development. AI is used to detect student error patterns and provide recommendations for materials that are appropriate to their level of understanding;

2) Based on Bojonegoro Local Wisdom. If previous studies have focused more on national or global digital media, this study emphasizes the use of folklore, traditional games, and regional languages as part of contextual literacy. This supports the preservation of local culture while increasing the appeal of learning for students; 3) Adaptive and Flexible Development Model. Using the ADDIE model (Analysis, Design, Development, Implementation, Evaluation), which allows for continuous feedback-based development. This worksheet is also web-based and mobile applications, allowing wider access compared to print media or static PDFs; 4) Gamification and Interactivity Support. Previous studies have only developed conventional LKPD or simple multimedia-based Student Worksheets, while this study includes gamification elements to increase student motivation. Interactive features such as AI-based quizzes, story simulations, and local culture-based challenges make learning more interesting.

The novelty of the proposal from the aspect of approach, method, and context is a new approach: integration of ai and local wisdom. Most studies only focus on AI technology without considering local cultural aspects, or vice versa, only using culture-based methods without modern technology. This study offers a unique combination of AI technology and local wisdom of Bojonegoro, providing a personalized and contextual learning experience for students of Ibtidaiyah schools.

Innovative Method: Machine Learning-Based Student Worksheets Development. Compared to traditional methods, AI in this worksheet will analyze student error patterns and adjust the level of difficulty of the questions or materials. This enables adaptive learning, where each student gets a learning experience according to their abilities.

Specific and under-researched context. This study focuses on Madrasah Ibtidaiyah schools, which has rarely received attention in the development of AI-based media. In addition, the use of local wisdom Bojonegoro in AI-based literacy learning is still a new area that has not been widely explored in previous studies.

With these advantages and novelties, this study not only provides significant academic contributions, but also helps improve students' literacy contextually and based on modern technology. Longitudinal studies to measure the long-term impact of using AI-based student worksheets on students' academic achievement and cultural understanding need to be conducted to provide stronger evidence on the effectiveness of

this approach. Comparative research between various models of AI integration in learning and their impact on different learning outcomes can also provide valuable insights for the development of better educational technology.

The development of educational technology in the digital era demands innovation in the development of learning media that can improve the quality of the teaching and learning process. Interactive Student Worksheets based on Artificial Intelligence are one of the innovative solutions that can optimize learning at the elementary education level (S. Suttrisno, 2025).The integration of AI technology in learning at Madrasah Ibtidaiyah schools not only provides better personalization of learning, but can also analyze students' individual needs and abilities in real-time.

The concept of local wisdom in education is an important aspect in the formation of student character and identity (Blessinzka, 2019). Bojonegoro as an area rich in cultural heritage has various local wisdoms such as Thengul Dance, Thengul Wayang, traditional food, and noble values of the local community. Integration of Bojonegoro's local wisdom in AI-based interactive student worksheets can be a bridge between modern technology and traditional values that need to be preserved.

AI-based interactive Student worksheet has special characteristics that distinguish it from conventional worksheets. This learning media is designed to be able to interact two-way with users, provide automatic feedback, and adjust the level of difficulty based on student abilities. (Sanaky, 2019). AI technology enables the worksheet to analyze student answer patterns, identify learning difficulties, and provide appropriate learning recommendations.

The development of this interactive Student Worksheet uses a digital platform that supports multimedia such as images, videos, audio, and interactive animations. The AI features integrated into the worksheet include an automatic assessment system, learning progress analysis, and feedback that is tailored to the individual needs of students (Bajaj & Sharma, 2018). The adaptive capabilities of this AI-based worksheet enable personalization of learning that can increase student motivation and engagement in the learning process.

Bojonegoro local wisdom integrated into student worksheets includes various cultural aspects such as the Larung Sesaji tradition, Thengul Dance, typical cuisine such as Ledre and Wader Kali, as well as the philosophical values of the Bojonegoro community. This integration is carried out through the development of learning content

that links academic materials with the local cultural context, so that students can understand the relevance of learning to their surroundings (S. Suttrisno et al., 2024).

The local wisdom-based approach in interactive student worksheets has the potential to improve students' understanding of cultural identity and regional values. Through traditional stories, local games, and examples of daily life of the Bojonegoro community, students can develop an appreciation of cultural heritage while learning academic concepts. This strategy is in line with the concept of contextual learning which has been proven effective in improving student learning outcomes.

The implementation of AI-based interactive worksheets has been proven to have a positive impact on the literacy skills of elementary school students. AI technology can identify students' reading ability levels and provide reading materials that are appropriate to their level (Rusilowati, 2019). The text-to-speech and interactive reading features in the worksheets help students who have difficulty reading to continue to follow the learning process well.

Digital literacy integrated into AI-based Student Worksheets provides students with essential 21st-century skills for their future. Students not only learn to read and write in traditional contexts, but also develop the ability to access, understand, and utilize digital information effectively. Research shows that the use of AI technology in literacy learning can increase student motivation and accelerate the process of understanding the material (Ahmad Sudi Pratikno, 2017).

CONCLUSION

The development of Interactive Artificial Intelligence Student Worksheet based on Local Wisdom Bojonegoro has proven effective in improving the literacy skills of elementary Madrasah Ibtidaiyah school students. The integration of AI technology with local wisdom creates a meaningful, personal, and contextual learning experience for students. The developed worksheet meets the criteria of valid, practical, and effective based on the results of expert validation and field trials. Despite the challenges in implementation, the potential of AI technology to transform learning at the elementary education level is enormous, especially when combined with an approach that values and preserves local wisdom. This research makes a significant contribution to the development of educational technology that is responsive to local needs but still follows global developments.

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REFERENCES

Agus, S. (2018). Design Methodology. [in Bahasa] Arttex.

Ahmad Sudi Pratikno. (2017). Implementation of Artificial Intelligence in Mapping Characteristics, Competencies, and Psychological Development of Elementary School Students Through Offline Platforms. [in Bahasa] *Universitas Negeri Yogyakarta 2017*, *September 2017*, 18–36. https://scholar.google.co.id/citations?view_op=view_citation&hl=id&user=-FbwaL4AAAAJ&citation_for_view=-FbwaL4AAAAJ:d1gkVwhDpl0C

Aka, K. A., Aprilia, H. M., Permana, E. P., & Afandi, Z. (2023). Natural Resources Utilization Comic Media Based on Local Wisdom: Mount Kelud Kediri. *International Journal of Elementary Education*, *7*(1), 124–133. https://doi.org/10.23887/ijee.v7i1.53783

Alawia, A. (2019). Application of Environmental Image Media in Improving Descriptive Writing Skills in Elementary Schools. [in Bahasa] *Pedagogik Journal of Islamic Elementary School*, *2*(2), 147–158. https://doi.org/10.24256/pijies.v2i2.959

Anggraeni, N. (2020). *Development of Student Activity Sheets (LKPD) Based on Local Wisdom (Batik Surabaya) to Improve Students' Critical Thinking Skills in Science Subjects for Fourth Grade Elementary School Students.* [in Bahasa]

Bajaj, R., & Sharma, V. (2018). Smart Education with artificial intelligence based determination of learning styles. *Procedia Computer Science*, *132*, 834–842. https://doi.org/10.1016/j.procs.2018.05.095

Blessinzka, L. (2019). Character Building Based on Javanese Local Wisdom. [in Bahasa] *Jurnal Pendidikan Guru Sekolah Dasar*, *8*(5), 487.

Eka Margareta Sinaga, Salamun, Suttrisno, Azis, M. Rusli B, Sugeng Pramudibyo, Habib Zainuri, Maya Nurlita, Fitria Meisarah, Sri Ayu Ashari, Endi Zunaedy Pasaribu, Wiwin R Kunusa, J. S. (2023). *Educational Research Methodology: An Introduction. [in Bahasa]* Yayasan Kita Menulis.

Fadli, A. (2020). The Effect of Local Wisdom-Based Elsii Learning Model on the Problem Solving and Communication Skills of Pre-Service Islamic Teachers. *International Journal of Instruction*, *13*(1), 731–746. DOI:10.29333/iji.2020.13147a

Firmansyah, D., & Saepuloh, D. (2022). Competitiveness: Digital Literacy and Digital Transformation. *... Business Digital*. https://journal.formosapublisher.org/index.php/jfbd/article/view/1348. https://doi.org/10.55927/jfbd.v1i3.1348

Ginting, E. S. (2021). Strengthening Literacy in a digital era. [in Bahasa] *... Bahasa Dan Sastra Indonesia (SemNas PBSI)-3*. https://digilib.unimed.ac.id/id/eprint/41217/

Handayani, T. U. (2020). Strengthening Literacy Culture in Character Building. [in Bahasa] *Literasi: Jurnal Bahasa Dan Sastra Indonesia ...*. https://jurnal.unigal.ac.id/literasi/article/view/3459 . https://dx.doi.org/10.25157/literasi.v4i1.3459

Harahap, R. H., Buulolo, C., & Marpaung, N. Z. (2023). Analysis of Connectivism Theory, Alternatives to Online Learning and Its Impact on Students' Learning Motivation. [in Bahasa] *Content: Journal of Communication Studies*, *00*(00), 0–000. https://doi.org/10.26594/register.v6i1.idarticle

Hidayat, N., & Khotimah, H. (2019). Utilization of Digital Technology in Learning Activities. [in Bahasa] *JPPGuseda | Jurnal Pendidikan & Pengajaran Guru Sekolah Dasar*, *2*(1), 10–15. https://doi.org/10.33751/jppguseda.v2i1.988

Inceoglu, M. M. (2022). Use of Metaverse in Education. *Lecture Notes in Computer Science (Including Subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, *13377*, 171–184. https://doi.org/10.1007/978-3-031-10536-4_12

Iwan Hermawan, S. A. M. P. I. (2019). *Educational Research Methodology (Qualitative, Quantitative and Mixed Method).* [in Bahasa] Hidayatul Quran.

Jiménez, Y., Vivanco, O., Castillo, D., Torres, P., & Jiménez, M. (2021). Artificial Intelligence in Neuroeducation: The Influence of Emotions in the Learning Science. *Innovation and Research*, *1277*. http://dx.doi.org/10.47205/jdss.2024(5-IV)50

Kemendikbudristek. (2021). *New Paradigm Learning*. [in Bahasa] Pusat Asesmen dan Pembelajaran, Kemendikbudristek.

Kong, F. (2020). Application of artificial intelligence in modern art teaching. *International Journal of Emerging Technologies in Learning*, *15*(13), 238–251. https://doi.org/10.3991/ijet.v15i13.15351

Lin, P. Y., Chai, C. S., Jong, M. S. Y., Dai, Y., Guo, Y., & Qin, J. (2021). Modeling the structural relationship among primary students' motivation to learn artificial intelligence. *Computers and Education: Artificial Intelligence*, *2*(October 2020), 100006. https://doi.org/10.1016/j.caeai.2020.100006

Maryo, F. A. A., & Pujiastuti, E. (2022). Gamification in Efl Class using Quizizz as an Assessment Tool. *Proceedings Series on Physical & Formal Sciences*, *3*, 75–80. https://doi.org/10.30595/pspfs.v3i.268

Mashudi, M. (2021). Modern Learning: Equipping Learners with 21st Century Skills. [in Bahasa] *Al-Mudarris (Jurnal Ilmiah Pendidikan Islam)*, *4*(1), 93–114. https://doi.org/10.23971/mdr.v4i1.3187

Maufidhoh, I., & Maghfirah, I. (2023). Implementation of Artificial Intelligence-Based Learning Through Puzzle Maker Media for Elementary School Students. [in Bahasa] *ABUYA: Jurnal Pendidikan Dasar*, *1*(1), 30–43. http://dx.doi.org/10.52185/abuyaVol1iss1Y2023284

Membaca, L. (2019). *Reading literacy activity index of 34 provinces.* [in Bahasa] *1*, 1–8.

Miftah, Z., Suttrisno, S., & Rozi, F. (2022). Building Villages Through Literacy Culture in Ngayung Village, Maduran District, Lamongan Regency. [in Bahasa] *Masyarakat*, *3*(2), 392–401. https://doi.org/10.46576/rjpkm.v3i2.1850

Murti, I., & Handayani, D. A. P. (2022). Educational Game Robot Adventure Nusantara: Improving Cultural Literacy. [in Bahasa] *Jurnal Ilmiah Pendidikan Profesi Guru*.

Nudiati, D., & Sudiapermana, E. (2020). Literacy as a 21st century life skill for students. [in Bahasa] *Indonesian Journal of Learning …*. https://journal.ilininstitute.com/index.php/IJoLEC/article/view/561 . https://doi.org/10.31960/ijolec.v3i1.561

Nugrohadi, S., & Anwar, M. T. (2022). Assembler Edu Training to Improve Teachers' Skills in Designing Project-based Learning According to the Independent Learning Curriculum. [in Bahasa] *Media Penelitian Pendidikan : Jurnal Penelitian Dalam Bidang Pendidikan Dan Pengajaran*, *16*(1), 77–80. https://doi.org/10.26877/mpp.v16i1.11953

O.E.C.D. (2019). PISA 2018 Results (Volume 1). What Students Know and Can Do. . . *OECD*.

Pardamean, B., Suparyanto, T., Anugrahana, A., Anugraheni, I., & Sudigyo, D. (2022). Implementation of Team-Based Learning in the Development of Artificial Intelligence-Based Online Learning. [in Bahasa] *Scholaria: Jurnal Pendidikan Dan Kebudayaan*, *12*(2), 118–126. https://doi.org/10.24246/j.js.2022.v12.i2.p118-126

Permana, P. E. (2017). *Development of interactive multimedia in the science subject, material describing the life cycle of animals in the environment around fourth grade elementary school students* (Vol. 10, Issue 2). [in Bahasa] Jurnal Ilmiah Pendidikan Guru Sekolah Dasar. https://doi.org/10.33369/pgsd.10.2.79-85

Pingge, H. D. (2017). Local Wisdom in School. *Jurnal Edukasi Sumba*, *1*(2), 128–135. https://doi.org/Https://Doi.Org/10.53395/Jes.V1i2.27

Pornpimon, C., Wallapha, A., & Prayuth, C. (2014). Strategy Challenges the Local Wisdom Applications Sustainability in Schools. *Procedia - Soc Behav Sci [Internet]*, *112*(Iceepsy 2013), 626–34. https://doi.org/10.1016/j.sbspro.2014.01.1210

Putri, I. (2022). Assessment in Learning. [in Bahasa] *Fakultas Tarbiyah Dan Keguruan Universitas Islam Negeri Raden Intan Lampung*, *1*, 1–51.

Rahadiantino, L. (2022). Implementation of Artificial Intelligence Learning for Elementary School Students in Batu City, Malang, East Java. [in Bahasa] *Jurnal Inovasi Pendidikan Dan Pembelajaran Sekolah Dasar*, *6*(1). https://doi.org/10.24036/jippsd.v6i1.115857

Rahman, A., Wibawono, D., & Pamungkas, Y. (2024). Proceedings of Webinar International Globalizing Local Wisdom: Integrating Cultural Heritage into Science and Humanities Education Optimalisasi Pembelajaran Berbasis Kearifan Lokal Menggunakan Artificial Intelligence di Era Revolusi Industri 4.0 dan Society 5.0. *Proceedings Series on Social Sciences & Humanities*, *19*. https://doi.org/10.30595/pssh.v19i.1352

Riyanto, Y. (2017). *Research Methodology* in Education. [in Bahasa] SIC.

Roesmawati, L., Suprijono, A., & Yani, M. T. (2022). *Development of Learning Handouts Based on Local Cultural Wisdom Reog in Social Studies Learning to Strengthen Character Education of Elementary School Students* (Vol. 6, Issue 5, pp. 8909–8922). https://doi.org/10.33394/jk.v9i1.6556. [in Bahasa].

Rosyidah, & Atmojo, S. E. (n.d.). Development of Integrated Science Learning Tools Using an Ethnoscience Approach. [in Bahasa] *Jurnal Pendidikan Sains (Jps*, *6*(1), 5. https://doi.org/10.26714/jps.6.1.2018.5-13

Rummar, M. (2022). Local wisdom in Schools. [iN Bahasa] *Jurnal Syntax Transformation*, *3*(12), 1580–1588. https://doi.org/10.46799/jst.v3i12.655

Rusilowati, A. (2019). Educating High-Level Thinking of Generation Alpha Students in the Era of Artificial Intelligence. [in Bahasa] *Seminar Pendidikan Nasional (SENDIKA)*, *2*(1).

Sanaky, H. A. (2019). *Interactive and Innovative Learning Media*. [in Bahasa] Kaukaba Dipantara.

Sawitri, Y., Yannaty, I. A., Widyastika, S. I., Harumsih, T. D., & Musyarofah, H. F. (2019). The impact of smartphone use on early childhood development. [in Bahasa] *"Pengembangan Sumberdaya Menuju Masyarakat Madani Berkearifan Lokal,"* 691–697.

Septiana, A. R., & Hanafi, M. (2022). Strengthening Teacher Readiness and Digital Literacy Training in the Implementation of the Merdeka Curriculum. [in Bahasa] *Joong-Ki: Jurnal Pengabdian Masyarakat*. http://dx.doi.org/10.56799/joongki.v1i3.832

Siemens. (2004). *Connectivism Teory*. http://www.ceebl.manchester.ac.uk/events/archive/aligningcollaborativelearning/Siemens.pdf

Sopani, A., Hartatiana, H., Atika, Z., Putri, A. D., & ... (2024). Development of Student worksheets with the Assistance of Artificial Intelligence Data Presentation Material to Strengthen Numeracy Skills. [in Bahasa] .... https://ejournal.unesa.ac.id/index.php/mathedunesa/article/view/60620 . https://doi.org/10.26740/mathedunesa.v13n3.p1000-1012

Srinivasan, V. (2022). AI & learning: A preferred future. *Computers and Education: Artificial Intelligence*, *3*(March), 100062. https://doi.org/10.1016/j.caeai.2022.100062

Subekti, M., & Suparman, S. (2020). Analysis of the need for E-LKPD to stimulate critical thinking skills with the discovery learning model. [in Bahasa] *Science, Technology, Engineering, Economics, Education, and Mathematics*, *1*(1).

Sugiyono. (2017). *Quantitative*, Qualitative and R&D Research Methods. Alfabeta. [in Bahasa]

Sujana, I. M., Saputra, A., Melani, B. Z., Ode, L., Munandar, A. H., & Andra, A. (2023). Development of Innovative English Teaching Modules for Middle Schools Using Artificial Intelligence (AI) and Game-Based Instructions (GBI). [in Bahasa] *Pengabdian Magister Pendidikan IPA*, *6*(3), 661–667. https://doi.org/10.29303/jpmpi.v6i3.5096

Sukrin, & Ihlas. (2024). *Integration of Ethnopedagogy and Artificial Intelligence: An Innovative Approach to Local Wisdom-Based Indonesian Language Learning. [in Bahasa] 2*(1), 1–15.

Suttrisno. (2025). Development of Higher Order Thinking Skills Evaluation Instruments Based on Ethnoscience in Independent Curriculum Science Learning. [in Bahasa] *JIIP - Jurnal Ilmiah Ilmu Pendidikan*, *8*(2), 2119–2126. https://doi.org/https://doi.org/10.54371/jiip.v8i2.7118

Suttrisno, F. Z. R. (2023). Integration of Local Wisdom Values to Optimize the Pancasila Student Strengthening Project at Elementary Madrasahs in Bojonegoro. [in Bahasa] *Pionir : Jurnal Pendidikan*, *12*(1), 54–76. https://doi.org/http://dx.doi.org/10.22373/pjp.v12i1.17480

Suttrisno, Fitria Nely Elmuna, D. N. F. (2024). The Influence of the VCT (Value Clarification Technique) Learning Model Based on Bojonegoro Local Wisdom on the Reading Literacy of Elementary Madrasah Students. [in Bahasa] *JIIP (Jurnal Ilmiah Ilmu Pendidikan)*, *7*(20), 629–634. https://doi.org/10.54371/jiip.v7i1.3087

Suttrisno, N. M. Y. (2024). Artificial Intelligence In Science Learning In Primary Schools. *International Journal Of Humanities Education And Social Sciences (IJHESS)*, *6*(3), 2854–2859. https://doi.org/https://doi.org/10.55227/ijhess.v3i6.840

Suttrisno, S. (2025). Development of Higher Order Thinking Skills Evaluation Instruments Based on Ethnoscience in Independent Curriculum Science Learning. [in Bahasa] *JIIP - Jurnal Ilmiah Ilmu Pendidikan*, *8*(2), 2119–2126. https://doi.org/10.54371/jiip.v8i2.7118

Suttrisno, S., Elmuna, F. N., & Fithriyah, D. N. (2024). The Influence of the VCT (Value Clarification Technique) Learning Model Based on Bojonegoro Local Wisdom on the Reading Literacy of Elementary Madrasah Students. [in Bahasa] *JIIP-Jurnal Ilmiah Ilmu Pendidikan*, *7*(1), 629–634. https://doi.org/10.54371/jiip.v7i1.3087

Suttrisno, S., Riyanto, Y., & Subroto, W. T. (2020). The Influence of the Local Wisdom-Based Value Clarification Technique (VCT) Model on Student Learning Motivation and Learning Outcomes. [in Bahasa] *Naturalistic*, *5*(1), 718–729. https://doi.org/10.35568/naturalistic.v5i1.836

Tomela, A. (2018). Vygotskian (but only partly Vygotsky) understanding of special education. *Educao Revista Quadrimestal*, *41*(3), 349.

Yulia, N. M., Jannah, R., & Sa, Z. (2023). Development of Learning Media Calculator Box Material for Addition and Subtraction in First Grade MI. [in Bahasa] *Journal of Elementary Educational Research*, *3*(1), 21–33. http://dx.doi.org/10.30984/jeer.v3i1.542

Yulia, N. M., & Suttrisno, S. (2024). Developing Local Wisdom-Based Augmented Reality Modules for Science and Social Studies Learning in Elementary Schools. *AL-ISHLAH: Jurnal Pendidikan*, *16*(4). https://doi.org/10.35445/alishlah.v16i4.5987

Zahara, S. L., Azkia, Z. U., & Chusni, M. M. (2023). Implementation of Artificial Intelligence Technology in the Field of Education. [in Bahasa] *Jurnal Penelitian Sains Dan Pendidikan (JPSP)*, *3*(1), 15–20. https://doi.org/10.23971/jpsp.v3i1.4022

Zulqadri, D. M., & Nurgiyantoro, B. (2023). Development of Web-Based Interactive Multimedia to Improve Cultural Literacy and Digital Literacy of Fifth Grade Elementary School/Islamic Elementary School Students. [in Bahasa] *JURNAL IPTEKKOM* https://jurnal.kominfo.go.id/index.php/iptekkom/article/download/4951/1919