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ORIGINAL

Reka Digital Storytelling Integrated AI (DST-AI) Physicists: Improving Digital Literacy of Students

Físicos de Reka Digital Storytelling Integrated AI (DST-AI): Mejorando la alfabetización digital de los estudiantes

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ABSTRACT

Introduction: the study addressed the perceived lack of engagement in history education, often seen as reliant on rote memorization and formal texts. It proposed that artificial intelligence (AI) could revitalize the subject by enabling historical characters to narrate their own stories, thereby creating a more captivating learning experience. This development research aimed to create and evaluate an AI-based digital storytelling (DST-AI) model to serve as a positive and flexible learning tool for students.
Method: the research followed a development methodology. This process included information gathering, planning, prototype creation, initial field trials, product revision, primary field testing, and a final operational revision. The product was tested with 23 students in a Physics Education class at the University of Adzkia to assess its validity, practicality, and effectiveness.
Results: the developed DST-AI model was deemed valid by experts in terms of its materials, software, and visual communication. It was also found to be highly practical, with an ease-of-use score of 81 %. The tool was effective, achieving a 75 % score in the practical category, and its media usability was rated 83 %, placing it in the very useful group.
Conclusions: the study demonstrated that utilizing AI technology to create educational materials can significantly enhance the learning environment. The positive outcomes from implementing DST-AI provide a strong foundation for further research into developing more engaging, creative, and enjoyable educational tools.

Keywords: Digital Storytelling; Artificial Intelligence; Video AI; Motivation; Digital Literacy.

RESUMEN

Introducción: el estudio abordó la falta de participación percibida en la educación histórica, a menudo vista como dependiente de la memorización y los textos formales. Propuso que la inteligencia artificial (IA) podría revitalizar el tema al permitir que los personajes históricos narren sus propias historias, creando así una experiencia de aprendizaje más cautivadora. Esta investigación de desarrollo tuvo como objetivo crear y evaluar un modelo de narración digital basado en IA (DST-AI) para que sirva como una herramienta de aprendizaje positiva y flexible para los estudiantes.
Método: la investigación siguió una metodología de desarrollo. Este proceso incluyó la recopilación de

información, la planificación, la creación de prototipos, las pruebas de campo iniciales, la revisión del producto, las pruebas de campo primarias y una revisión operativa final. El producto se probó con 23 estudiantes en una clase de Educación Física en la Universidad de Adzkia para evaluar su validez, practicidad y efectividad.
Resultados: el modelo DST-AI desarrollado fue considerado válido por los expertos en términos de sus materiales, software y comunicación visual. También se encontró que era muy práctico, con una puntuación de facilidad de uso del 81 %. La herramienta fue efectiva, logrando una puntuación del 75 % en la categoría práctica, y su usabilidad en medios fue calificada con un 83 %, ubicándola en el grupo muy útil.
Conclusiones: el estudio demostró que la utilización de la tecnología de IA para crear materiales educativos puede mejorar significativamente el entorno de aprendizaje. Los resultados positivos de la implementación de DST-AI proporcionan una base sólida para futuras investigaciones sobre el desarrollo de herramientas educativas más atractivas, creativas y agradables.

Palabras clave: Narración Digital; Inteligencia Artificial; IA de Video; Motivación; Alfabetización Digital.

INTRODUCTION

Digital literacy is very important in the era of technology for information and communication.[1] In the use of technology, especially smartphones, most of the use of smartphones among students is only for consumptive purposes; there is still a low awareness of students' digital literacy.[2,3] The capacity to locate, work with, assess, use, develop, and employ digital media sensibly, thoughtfully, cautiously, and suitably in accordance with its intended application is referred to as digital literacy.[4,5] Through understanding and mastery of digital literacy, individuals can become intelligent, wise, and effective users in using digital media and face challenges that arise in the current digital era.[6,7,8]

Physics education plays a crucial role in shaping students' understanding and interest in natural sciences. Although there is a lot of potential possessed by physics scientists, student motivation in studying physics often encounters challenges.[9,10] Learning the History of Physics, in particular, often involves several problems, so that learning becomes boring for students. What's more, learning often lacks the emotional involvement of students, making it difficult for them to connect with the material.[11] To overcome this challenge, an innovative solution can be implemented by utilizing the sophistication of AI.[12,13,14] By using AI technology, we can relive the life stories of physicists, create more interactive and interesting learning experiences, and not only take advantage of current technology but also provide a more humane personal perspective on the lives of the world's physicists. AI-integrated digital storytelling (DST-AI) is a form of digital narrative that uses artificial intelligence (AI) to create, process, or enhance elements of a story. DST-AI is expected to increase student engagement and motivation, as well as digital literacy.[15] Digital literacy of students increases when they can access materials anytime, anywhere, and at their own pace of learning.[16]

This research aims to design, develop, and evaluate DST-AI media as an innovative learning tool in the History of Physics course, with the specific purpose of enhancing students' digital literacy and learning motivation. To achieve these objectives, this research employed a systematic development process based on the Borg and Gall model. The process began with a preliminary study to identify learning needs, followed by the planning and creation of DST-AI media. Subsequent validation, revisions, and field trials ensured the product's practicality and effectiveness, while final evaluation assessed its overall impact. This evaluation measures how far the learning objectives have been achieved and determines the aspects that may require further improvement.

Digital Storytelling is an innovation in the presentation of teaching materials by presenting learning videos.[17] For example, to explain the theory of the concept of educational facilities and infrastructure can be presented with multimedia by combining images, writing, animation, and voices from the educators themselves, so that it is more motivating and reinforces the message. Lessons delivered. Storytelling is one of the oldest and most valuable forms of folk art in the study of history, culture, and moral values.[18] Storytelling is about assembling a work. Stories, which can be in the form of desires, struggles, realizations, achievements, or inspirations, can be translated into multimedia presentations called digital storytelling.[19] The term "storytelling" denotes the experience of receiving-listening-understanding a story rather than discovering and telling.[20] The research conducted by [21] is entitled The Influence of Digital Storytelling Media on Student Learning Outcomes, using an experimental method. Based on the analysis of research data, the research results are as follows: There is significant evidence of influence, shown by the average difference in learning outcomes taught using DST media. Another study, entitled "The impact of digital storytelling on pre-service teachers' digital literacy in teacher education", the digital literacy skills of pre-service teachers have increased.[22] Based on the literature review of the above research, it can be concluded that the importance of position of learning media in supporting learning success. In accordance with the development of technology and the times, digital storytelling teaching

materials are an alternative for teachers in delivering learning to students.[23,24,25]

The use of AI-based applications has evolved to aid in the process of learning. The benefits of AI in education are numerous, including increased student participation, creativity, problem-solving skills, and better learning outcomes.[26,27,28,29] Further research shows that AI increases students' motivation to learn and helps them understand concepts.[30,31] The effectiveness of AI in education has been demonstrated to improve student achievement in problem-solving, critical thinking skills, and learning satisfaction.[32,33,34] AI can improve students' visual-spatial skills.[35,36] AI's application in education has significantly improved student learning achievement.[12,37] Therefore, to address the dual challenges of low digital literacy and diminishing motivation in physics education—particularly in the historically rich but often dry subject of physics history, this research proposes the development of an AI-Integrated Digital Storytelling (DST-AI) medium. By synergizing the engaging power of storytelling with the innovative capabilities of artificial intelligence to create immersive narratives, this study aims to engineer a valid, practical, and effective learning tool.[13,38] The successful implementation of DST-AI is anticipated to not only revitalize the learning experience by fostering a deeper emotional and intellectual connection to the material but also to serve as a strategic intervention for enhancing the digital literacy competencies of physics students, ultimately bridging the gap between technological consumption and meaningful educational application.

METHOD

This study employed a research and development (R&D) approach adapted from the Borg and Gall model, which was streamlined into seven stages to ensure efficiency while maintaining methodological rigor.[39,40,41,42]

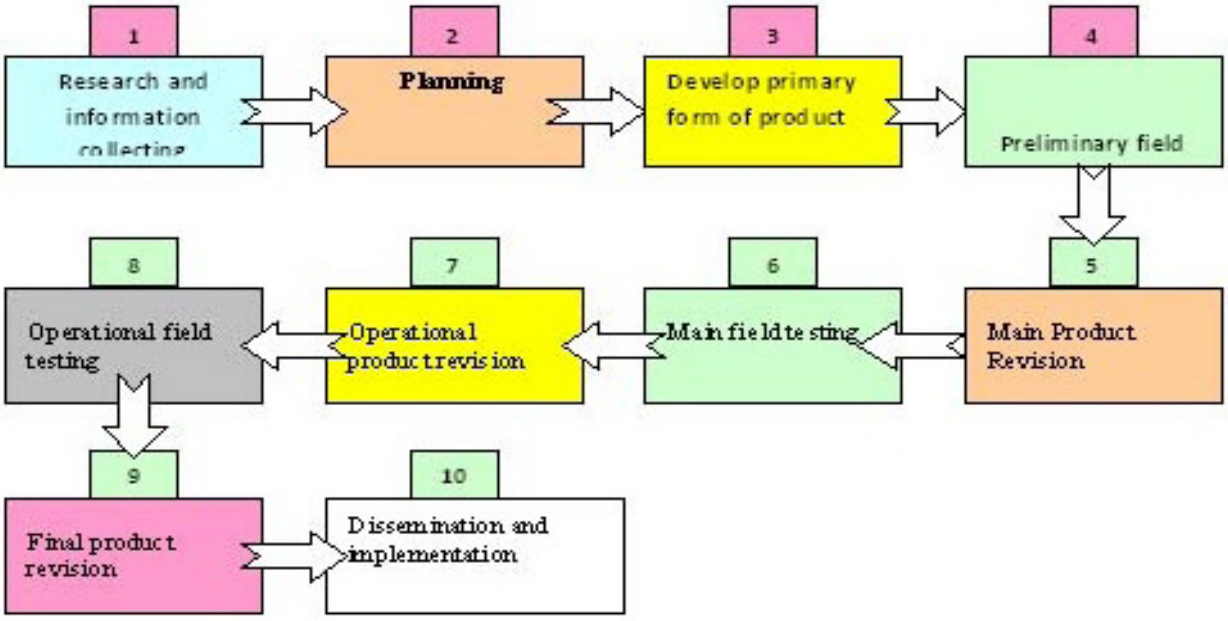

Figure 1. The Borg & Gall development approach was used to adapt the schematic development process[43]

Ethical approval and all participants provided informed consent before engaging in the study. The research design integrated both qualitative and quantitative methods, combining expert validation, student surveys, and pretest–posttest experiments to provide a comprehensive evaluation of the developed media. Based on the above research procedure, the research will be carried out for one year to obtain a valid, practical, and effective product. As an explanation of the following research achievements, it is seen in the figure that follows:

The preliminary study was conducted through classroom observations in Physics Education courses at Universitas Adzkia, Padang, between February and March 2024. The purpose of these observations was to explore how lecturers delivered the History of Physics course and to identify problems related to student engagement, particularly the low integration of digital resources. This stage also included informal discussions and semi-structured interviews with three lecturers and ten students, which provided insights into learner needs, motivational challenges, and expectations for technology-enhanced learning. In addition, a systematic literature review was conducted covering digital storytelling and artificial intelligence in education from 2010 to 2023, using Scopus and Google Scholar databases with keywords such as "digital storytelling," "artificial intelligence," "physics education," and "digital literacy." This review provided a theoretical basis for the design of AI-integrated digital storytelling media and aligned the product with contemporary trends in technology-supported pedagogy.[44,45,46]

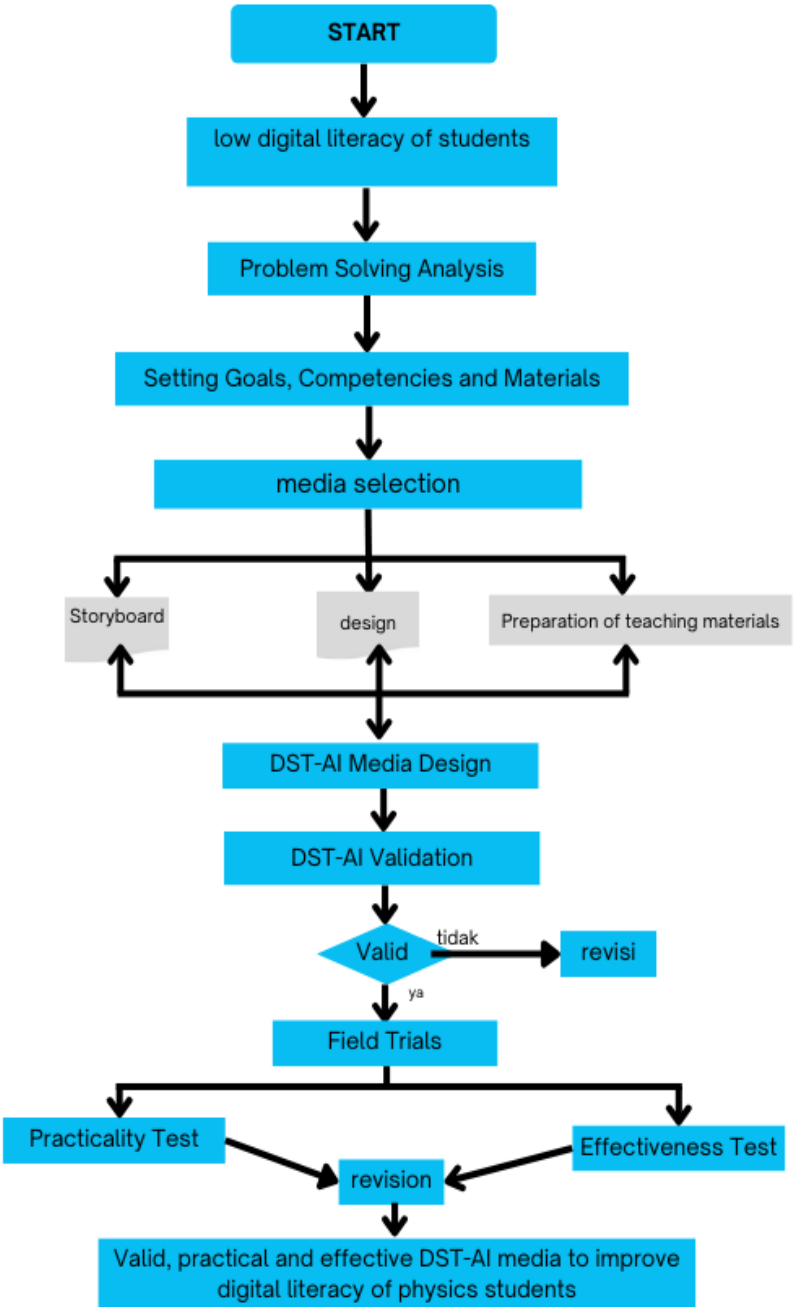

Figure 2. Research Flow

The planning stage focused on the design of research instruments and the drafting of the product. Validation sheets were created for material, software, and visual communication experts, while a 14-item Likert-scale questionnaire was developed to measure student perceptions of practicality. To assess learning effectiveness, pretest and posttest instruments were constructed, targeting indicators of digital literacy such as the ability to access, interpret, and use digital information responsibly.[47,48,49,50] Based on the syllabus and Semester Learning Plan of the History of Physics course, the DST-AI videos were drafted to feature six major physicists: Thomas Edison, Newton, Galileo, Ibn al-Haytham, Al-Battani, and Werner Heisenberg. The learning outcomes emphasized both content mastery and the enhancement of students' digital literacy skills.[51]

The development stage involved producing the prototype of the DST-AI video. The process began with the creation of storyboards and flowcharts that mapped out narration, visuals, and transitions. Scripts were written to ensure historical accuracy and pedagogical clarity. The videos were built using Canva with the D-ID AI Presenter feature, which allowed the integration of AI-generated avatars and synthesized Indonesian narration. Supporting components included background images, animations, and typography customized to student characteristics. The prototype was uploaded privately to YouTube to enable easy access during the validation process.

Validation was conducted by five experts, consisting of two material experts, two media experts, and one

language expert. Each expert assessed the product using structured validation sheets focusing on accuracy of content, instructional design, technical quality, and clarity of communication. The feedback emphasized the need to add images of discoveries, refine the narration, and correct typographical errors. Following this stage, revisions were carried out to improve the accuracy, clarity, and attractiveness of the DST-AI videos.

The field testing phase consisted of two stages. Preliminary testing was carried out with five students to examine usability, clarity, and engagement. After revisions, the main field test was conducted with 23 students of Physics Education at Universitas Adzkia. Students accessed the DST-AI media through YouTube links during the History of Physics class. Data collection included the practicality questionnaire, which measured ease of use, time effectiveness, and overall usefulness, as well as open-ended student comments that provided qualitative insights.

The evaluation stage focused on determining the effectiveness of DST-AI media in improving digital literacy. A pretest–posttest design was implemented, and data were analyzed using normalized gain (N-Gain) scores[52] and paired-sample t-tests with a significance level of 0,05. Quantitative data were processed with SPSS to identify statistical differences, while qualitative feedback from students was analyzed thematically to capture perceptions of strengths, weaknesses, and suggestions for future improvement. The combination of validation scores, practicality measures, and learning outcomes provided a comprehensive picture of the feasibility, practicality, and effectiveness of the DST-AI media.[5,13,23,24,38,39,40,53,54]

RESULTS

This section is an important part; the data obtained by the researcher will be presented and discussed in more depth. The Borg & Gall development paradigm is used in media design.[53] A thorough description of each phase of the product development process is provided below:

Preliminary

At this stage, the researcher conducts field studies and literature reviews. Research field studies aim to gather information on the fundamental issues that determine the need for media development. Needs analysis is carried out systematically, determining and evaluating the needs, gaps, and goals of individuals, organizations, and communities and goals. It involves collecting and analyzing information.[34] The field study was carried out through observation, and the following findings were obtained:

- The growing use of digital media in teaching and learning is indicative of a new learning culture. On their cellphones, students can use resources like Zoom Meeting, Google Meet, and many digital learning management systems (LMS).
- When faced with obstacles like lengthy distances, a lack of physical classrooms, or scheduling changes that result in classroom adjustments, digital media is one option for a more effective teaching and learning process.
- A lot of educators continue to utilize basic instructional resources like papers, PDFs, and PowerPoint presentations.
- To improve the efficacy and efficiency of the learning process, there is a strong demand for interesting educational resources.
- Student subject topic mastery may be more ideal.

Planning

The information gathered from the first study was used to develop a DST-AI video development strategy. Planning is essential in optimizing the use of resources and turning them into viable products. In addition, planning can be a good guide and encouragement for effective administrative decision-making.[55]

The planning process includes:

- Determine the purpose of the research, specifically to create DST-AI videos.
- Identify contextual student characteristics.
- Determining the Learning Outcomes of the Course Program for the History of Physics course, especially focusing on physicists.
- Drafting the initial design for the DST-AI video.
- Plan out the phase of product testing.
- Developing the initial form of the product draft, creating the product's first iteration, or draft.

In the History of Physics course, there is a section of material related to classical physicists, Islamic physicists, and modern physicists. Based on the Syllabus and SLP of the History of Physics course, the selection of topics is in three parts of the material, with the elaboration of the characters to be designed, there are 6 figures. As shown in table 1.

Table 1. Topic Selection for DST-AI

No	Topic	Tokoh
1.	Classical Physics	1. Thomas Alfa Edison 2. Newton 3. Galileo
2.	The Influence of Islamic Figures on Physics	1. Ibnu al haytam 2. Albhatani
3.	Inspired by Modren	1. Werner Heisenberg

Development

The development product's writing process is guided by the conclusions drawn from the preliminary study and research planning. During this phase, researchers created an early version of the DST-AI video, focusing on tool analysis/finding applications, typography, scheme colors, and images customized to the traits of the pupils. The Outcome Learning Course Program's list of instructional material elements is strictly followed during the development process. A storyboard is then produced. Storyboards serve as the project's visual plan. After the storyboard and flowchart are finished, DST-AI video development begins. The development of this DST-AI video was built using the AI presenter feature of the Canva application, an online platform.

In the process of making DST-AI videos using the Canva application, several steps must be taken, including:

1. Download the Canva app.
2. Log in to the Canva app via email.

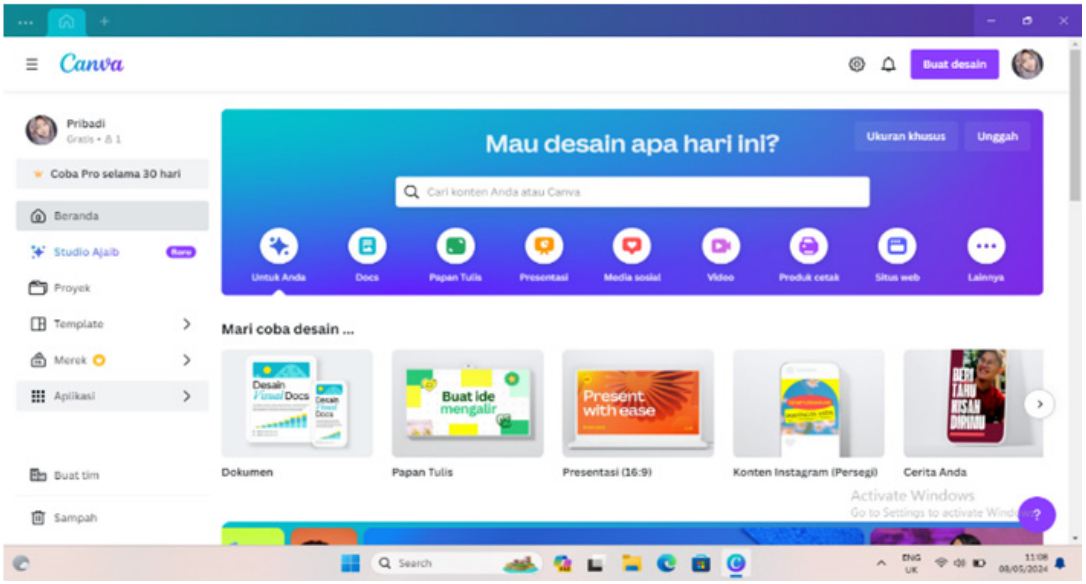

Figure 3. Canva homepage

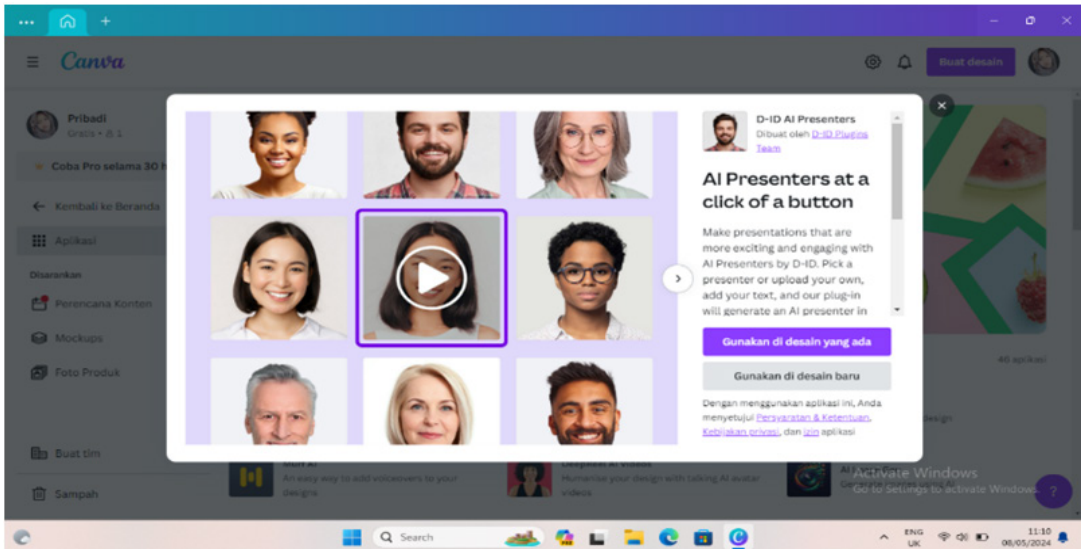

Figure 4. Canva´s AI Presenters page

3. Download Apps and click D-ID AI Presenters.
4. Then click and select use in existing design.
5. Upload photos to use.

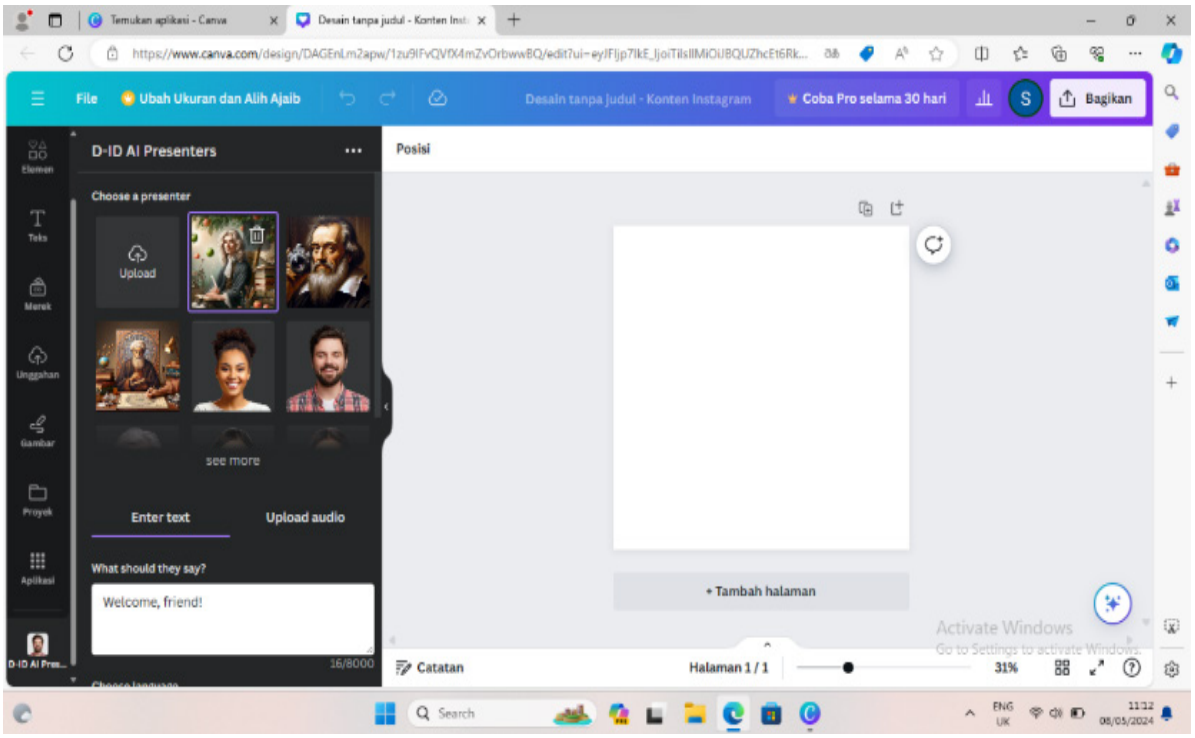

Figure 5. Canva´s new project page

6. Enter the desired text narration.

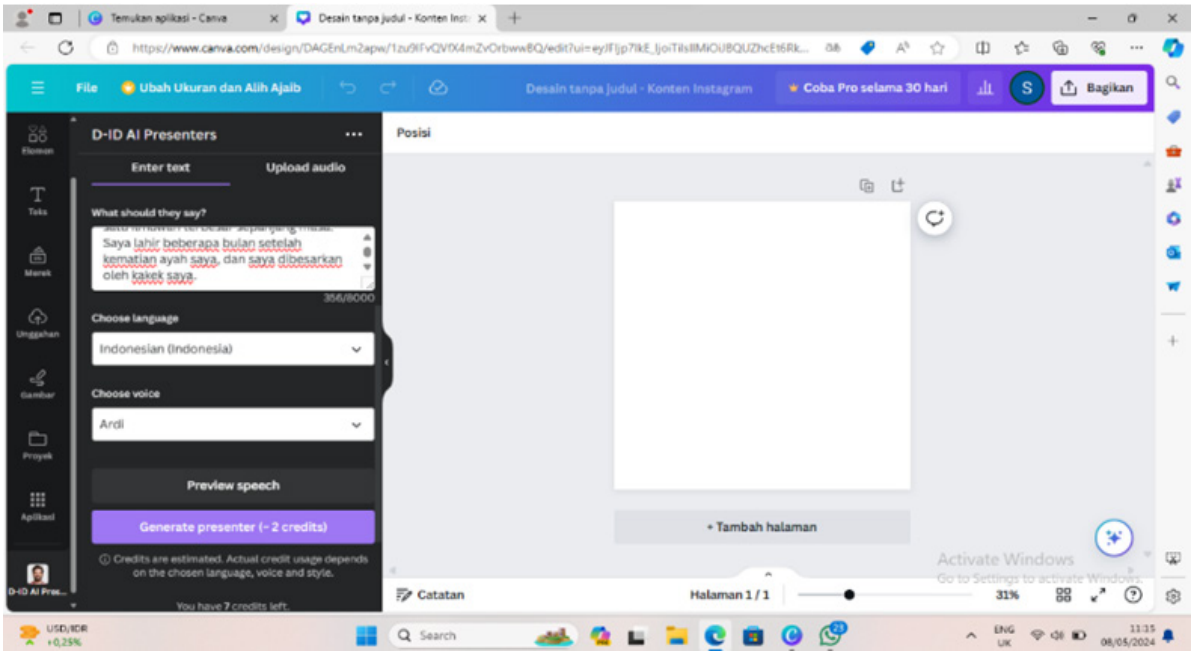

Figure 6. Example of text input

7. Select Indonesian.
8. Then select the sound you want.
9. Then click generate presenters.

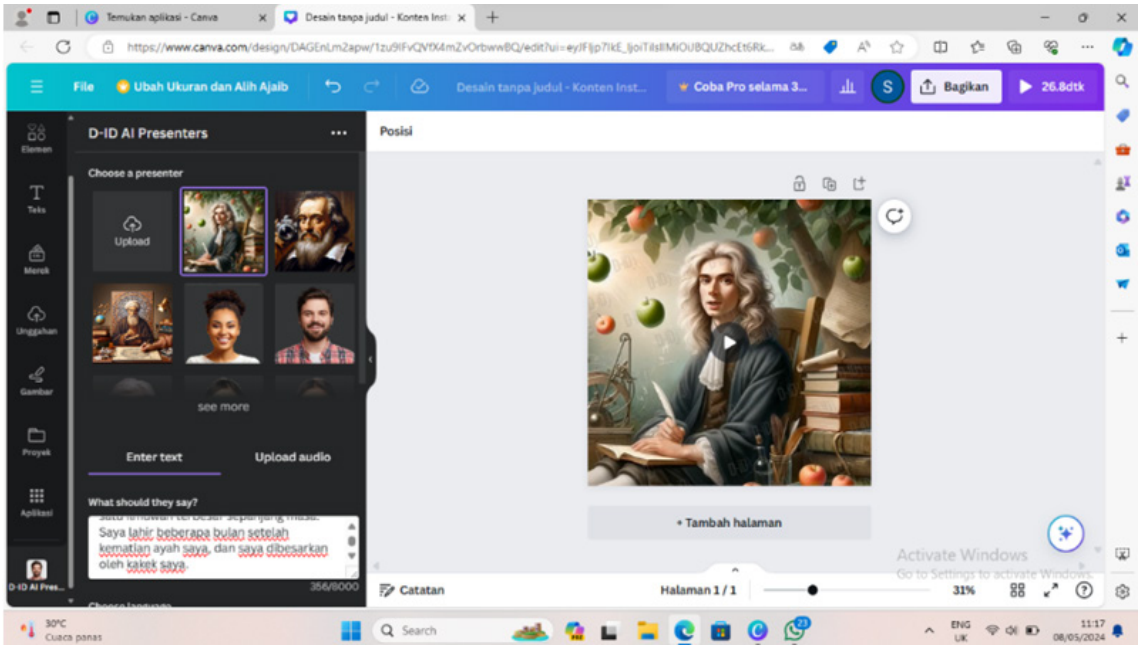

Figure 7. Example of image, text, and animation integration with AI in Canva

10. Wait for the photo to appear.
11. Then Download the Video.

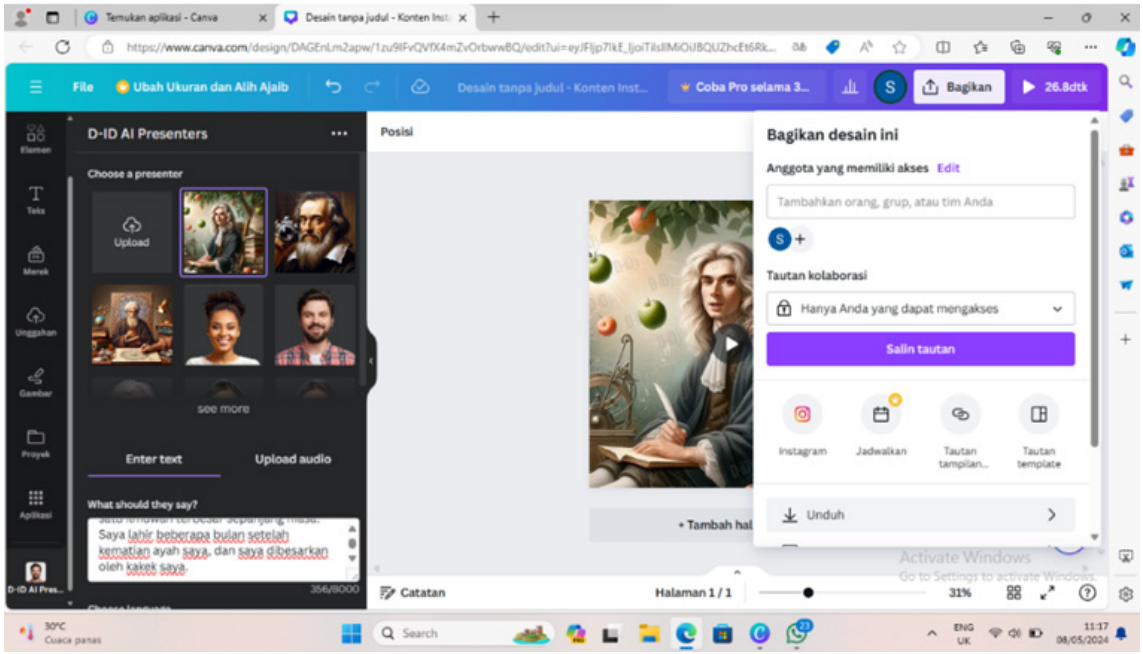

Figure 8. Video download option in Canva

The results of this study are presented in three categories: expert validation, practicality testing, and effectiveness testing of the DST-AI media. Findings are reported objectively and without interpretation, which is addressed in the subsequent discussion section.

Validation

Media specialists participate in the first field testing to assess and gather information on the learning product's usefulness. During the Major Product Revision phase, enhancements will be informed by the insights obtained from this preliminary trial. Critical expert assessments include: 1) Video content is suggested to display the forms of discoveries from scientists. 2) Add relevant pictures or equations when explaining. 3) There are some typo errors in the writing in the video. Enhancing language usage is one of the suggestions for enhancements in the Major Product Revision phase, and improving video content. The following results of validation by experts for several aspects as observed in the table below:

Table 2. Expert Validation Results

Validator	Material Aspects	Aspects of Software Engineering	Visual Communication Aspects
RZ	85	75	70,5
IS	77,5	75	73
Average	81,25	75	71,75
Category	Highly Valid	Valid	Valid

Validation involved five experts: two subject-matter experts, two media experts, and one language expert. The results indicated that the average score for material content was 81,25, categorized as highly valid. The average software engineering score was 75, categorized as valid, and the average score for visual communication was 71,75, also categorized as valid. Overall, the DST-AI media met the validity requirements across all evaluated aspects, ensuring the feasibility of the product for classroom use.

Based on the findings of the initial field tests, the development team made several revisions to improve the product. Utilizing data from the initial testing phase, they reconfigure the product development process and make the necessary adjustments. Suggestions and improvements from experts aim to improve feasibility. In addition, expert feedback emphasizes the need for more varied designs to increase student interest during learning sessions.

Evaluation

Practicality

In order to gather information about the first product's usefulness as a learning tool, the extended field test will assess it with students, paying particular attention to format, content, and linguistic elements. Refinements in the Operational Product Revision phase will be guided by the results of this extended testing period. Field tests have been provided to students of Physics. Determining the product's practicality criteria after obtaining the percentage of practicality value, grouping is carried out according to the criteria contained in the following table:

Table 3. Practicality Criteria

Percentage (%)	Criterion
0 - 20	Impractical
21 - 40	Less Practical
41 - 60	Quite Practical
61 - 80	Practical
81 - 100	Very Practical

From the results of the answers to the practicality questionnaire with fourteen statements and four answer score criteria filled in by twenty-one students, the following results were obtained:

Table 4. Practicality Test Results

No	Statement	Result	Category
1.	Ease of Use of DST-AI Media	81 %	Very Practical
2.	Time Effectiveness	75 %	Practical
3.	Uses of Media	83 %	Very Practical

Practicality was evaluated using a 14-item questionnaire completed by 21 Physics Education students. The results showed that the "ease of use" dimension obtained an average score of 81 %, which fell into the very practical category. The "time effectiveness" dimension yielded an average score of 75 %, categorized as practical, while the "media usefulness" dimension received an average score of 83 %, categorized as very practical. The combined mean score across all dimensions was 79,6 %, placing the DST-AI media within the practical category.

Qualitative responses from the open-ended section of the questionnaire supported these findings. Students noted that the videos were easy to access via YouTube, visually clear, and straightforward to understand. Several students suggested that the learning experience could be further enriched by including additional

examples of physicists' discoveries.

Feedback from both experts and students was subsequently used to guide product revision. The main recommendations focused on enhancing variation in the videos, particularly by integrating more images and visual representations of scientific discoveries. These inputs were constructive and provided a basis for refining the DST-AI media to increase its feasibility for broader classroom implementation.

Effectiveness

Operational testing is carried out after revisions based on the results of initial testing and expansion. This operational test aims to evaluate the effectiveness of Android-based interactive multimedia in improving students' understanding of subject matter in accordance with the CPL-study program and CPMK standards. The results of these operational tests will inform further improvements during the Final Product Revision phase. The operational test was conducted online, with each student using their device. It involves three stages: 1) Pretest, administered to measure a student's initial understanding of the material; 2) Application: The research sample uses DST-AI for the History of Physics course; DST-AI media that have passed the final revision stage are uploaded on YouTube, and its dissemination is achieved by sharing YouTube links to students.

This makes it easier for students to access without having to download first, and enriches the learning of digital material objects in learning physics history courses, in addition to books. Of course, DST-AI videos are very helpful for students in understanding material related to the physics figures being studied. The following is a view of the DST-AI video that has been uploaded to YouTube. 3) Post-test, provided to assess students' understanding after using the product. The effectiveness of the product in improving conceptual mastery was evaluated using a normalized reinforcement score, calculated using the RR Hake formula. A summary of the N-Gain score from the pretest-posttest results using Android-based interactive multimedia is presented in the following table.

Table 5. N-Gain

Pretest Average	Post-Test Average	Gain	N-Gain
83,2	103,2	20	0,5

Based on the analysis of the pretest and posttest scores, the normalized gain (N-Gain) was 0,5, which falls into the medium category. This result indicates that the use of DST-AI media contributed to a moderate improvement in the digital literacy skills of students in the Physics Education program, particularly in the History of Physics course.

Before conducting the paired-sample t-test, a normality test was performed to ensure the data met statistical assumptions. The results showed significance values of 0,184 and 0,645, both greater than the alpha level of 0,05, indicating that the data were normally distributed. Given the fulfillment of this assumption, a paired-sample t-test was subsequently carried out. The outcomes of the t-test are presented in figure 9.

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	pretest - postest	-20.000	13.702	4.567	-30.532	-9.468	-4.379	8	.002

Figure 9. Test Results t

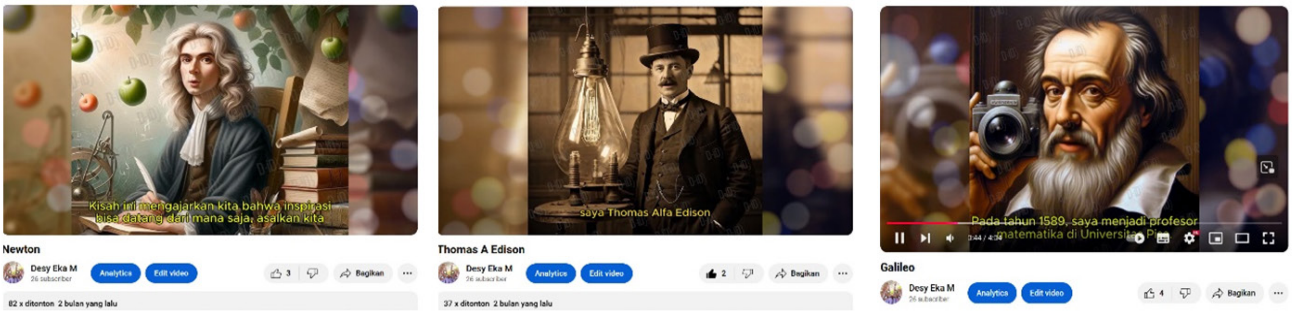

Figure 10. DST-AI Video Display on Youtube

The results of the paired-sample t-test indicated a significance value of p = 0,002, which is less than the threshold of 0,05. Therefore, the null hypothesis (H_0) was rejected and the alternative hypothesis (H_1) was accepted.

This finding demonstrates that there was a statistically significant difference between the pretest and posttest scores, confirming that the use of DST-AI media had a positive impact on improving the digital literacy of Physics Education students in the History of Physics course.

In figure 10, it can be seen that DST-AI media that has passed the final revision stage is uploaded on YouTube, and its dissemination is achieved by sharing YouTube links to students. This makes it easier for students to access without having to download first, and enriches the learning of digital material objects in learning physics history courses, in addition to books. Of course, DST-AI videos are very helpful for students in understanding material related to the physics figures being studied. The following is a DST-AI video that has been uploaded to YouTube. AI-integrated video-based learning media is a learning medium that helps students learn material more fun and interesting than media in general. It is an innovation and needs to be developed for learning media in other courses. The following are student comments on YouTube related to the DST-AI video media.

DISCUSSION

The design of DST-AI media originated from the need for analysis carried out. This study's initial phase indicated a strong need for engaging educational materials, effectiveness, and efficiency in the learning process. These findings are in line with previous research, suggesting that synchronous instruction combined with interactive tests, video recordings, and learning management systems can help teachers increase student learning.[58] A literature review is conducted to gather relevant information that supports product development. The literature claims that learning media play a critical role in accomplishing educational objectives through the efficient delivery of learning content. It was highlighted that educational media can increase motivation to learn by overcoming constraints on time, location, energy, and senses. To make teaching materials more engaging, it is crucial to build DST-AI learning media, effective and efficient in delivering materials.[59]

Considering how quickly artificial intelligence is developing, using it to create educational media is promising.[29] Research [60] Found that college students use smartphones and social media every day, with the existence of AI-integrated digital learning media is a medium that is expected to facilitate students' learning of the content at any moment and anywhere through their smartphones. In the development of DST-AI media, it requires good planning, design, and design of media. It takes significant thought to rank the importance of the content materials according to the curriculum and the characteristics of the students. Based on the results of the validation of the research with experts, it shows that DTS-AI is suitable for use as a learning medium and is suitable for material aspects, software aspects, and visual communication aspects. This conclusion is supported by the practicality in the use of DST-AI media, from three aspects, namely the simplicity of usage and time-saving, and media usability. The DST-AI display of physicists is understandable learning content, and has a varied appearance, so that students are interested. Videos can effectively communicate more varied and realistic notions about what it means to be a scientist.[61] Constructivist Approach Philosophy, which promotes pupils to develop knowledge, is in line with this. Overall, through the media, DST-AI shows that by engaging technology and with the use of AI, learning environments can become more accessible and sustainable, giving all students, regardless of location or socioeconomic background, equal chances to succeed.[62]

From the data from the research results, it is clear that the AI-based digital storytelling media DST-AI that has been developed has great potential in the world of education, especially in improving digital literacy and learning motivation of physics students.

Expert Validation

The experts involved in this study gave excellent ratings of your DST-AI media. They assessed that this media was composed with highly relevant material, good software design, and an attractive and communicative visual

display. The test results show that DST-AI media is very easy to use, effective in saving time, and is considered very useful by users. This indicates that this medium can be easily adopted in the learning process.

Influence on Learning, Motivation, and Digital Literacy

Statistical analysis shows a significant increase in both learning motivation and digital literacy of students after using DST-AI media. Motivation: Students who use DST-AI media show a very significant increase in learning motivation. This indicates that this media is able to make physics learning more interesting and relevant for students. Digital literacy there is a significant improvement in students' digital literacy skills after using DST-AI media. This shows that this media is effective in improving students' ability to access, understand, and utilize digital technology.

The creation of DST-AI media stemmed from the need identified in the first phase of this study, which revealed the high demand for engaging learning materials to improve the effectiveness and efficiency of course content delivery. These findings are in line with previous research, showing that teachers can improve online learning by combining synchronous learning with video recordings, interactive quizzes, and learning management systems. [10] A literature review is conducted after a preliminary study to gather relevant information that supports product development. According to the literature, learning media are very important in achieving educational goals by delivering learning content effectively. Martono[11] emphasized that learning media can overcome the limitations of space, time. Energy and senses, while fostering the spirit for learning. The development of learning media, including DST-AI Video, is essential to address problems in the learning process.[12] Given the rapid development and widespread use of smartphones, learning media that is easy to access using Android is a promising area.[13] Malik et al.[14] found that college students use smartphones and social media daily.

Adding digital content to the course learning process requires careful planning to create engaging material that adds value and emphasizes key concepts. Whether implementing lecture capture technology or redesigning courses in a reverse format, careful consideration is required to prioritize important content. The results of the study show that the resulting DST-AI Video media is suitable for use as a learning medium and feasible in terms of format, content, and language. This conclusion is supported by the app's ease of use, colorful display, understandable learning content, and ability to provide a wealth of learning materials, keeping students happy. Brečka et al.[15] also stated that DST-AI video media learning positively affects students' learning motivation. Effective interactive learning multimedia should have clear competencies and objectives, user instructions, and material delivery clarified with images and animations.[16] In addition, the Operational Field Testing stage showed a significant improvement based on the results of the pretest and post-test, confirming that DST-AI video media effectively improves students' digital literacy skills and student learning motivation. These findings are consistent with previous research by Rausyan[17]. This shows that video-based learning has a positive impact on student motivation. Ririen[18] also found that learning video media can increase student motivation. DST-AI video media supports personalized learning with independent access, centering the learning process on students. This is in line with the philosophy of the Constructivist Approach, which encourages students to build their knowledge. In addition, the success of DST-AI videos depends on providing learners with diverse opportunities to access and utilize the information available through smartphones. Based on the results of the research that has been conducted, it can be concluded that the AI-based digital storytelling media DST-AI developed in this study is a very promising innovation in the world of education. This media is not only able to increase students' motivation to learn, but also plays an important role in improving their digital literacy.

CONCLUSIONS

This study concludes that the development of AI-integrated Digital Storytelling DST-AI media for the History of Physics course is feasible, practical, and effective. Expert validation confirmed that the product met the required standards for content, software, and visual communication. Student responses showed that the media was easy to use, time-efficient, and useful, placing it in the practical category. Effectiveness testing further demonstrated significant improvements in students' digital literacy, with medium gains and statistically significant results in the pretest–posttest analysis. In summary, DST-AI media represents a concrete and innovative tool that can enhance the quality of physics learning by fostering both engagement and digital competence among students.

BIBLIOGRPHIC REFERENCES

1. Naufal HA. Literasi Digital. Perspektif. 2021;1(2):195–202.

2. Hastini LY, Fahmi R, Lukito H. Apakah Pembelajaran Menggunakan Teknologi dapat Meningkatkan Literasi Manusia pada Generasi Z di Indonesia? J Manaj Inform. 2020;10(1):12–28.

3. Muliani. Validity And Practicality Of Infographic Teaching Media In The Basic Science Concepts Course. Pros CELSciTech. 2021;5:13–9.

4. Amarulloh RR. Pengembangan Media Pembelajaran Fisika Dasar Berbasis Literasi Sains Dengan Menggunakan Google Sites. J Inov dan Pembelajaran Fis. 2022;9(2):154–64.

5. Iswari M, Afdal A, Nurhastuti N, Syahputra Y, Ismail RN. Validation of Career Planning Instrument for Deaf (CPID): Rasch Model Analysis. In: AIP Conference Proceedings. AIP Publishing; 2023.

6. Warsihna J. Meningkatkan Literasi Membaca Dan Menulis Dengan Teknologi Informasi Dan Komunikasi (Tik). J Kwangsan. 2016;4(2):67.

7. Ismail RN, Mudjiran M, Neviyarni N, Nirwana H. Creative approach guidance and counseling facing independence learning policy: Minimum competency assessment and survey characters in the industrial revolution 4.0. E-Tech. 2020;8(1):391345.

8. Ismail RN, Fauzan A, Arnawa IM. Analysis of student learning independence as the basis for the development of digital book creations integrated by realistic mathematics. In: Journal of Physics: Conference Series. IOP Publishing; 2021. p. 12041.

9. Muliani DE, Kasmira N, Yusmanila Y. Validasi dan Praktikalitas Bahan Ajar Berbasis Google Sites. Edukatif J Ilmu Pendidik. 2023;5(2):1250–7.

10. Andriani R, Rasto R. Motivasi belajar sebagai determinan hasil belajar siswa. J Pendidik Manaj Perkantoran. 2019;4(1):80.

11. Muawanah EI, Muhid A. Strategi Meningkatkan Motivasi Belajar Siswa Selama Pandemi Covid – 19 : Literature Review. J Ilm Bimbing Konseling Undiksha. 2021;12(1):90–8.

12. Gusli RA, Zaki2 S, Akhyar M, Islam U, Syaikh N, Djamil M, et al. Tantangan Guru terhadap perkembangan teknologi agar memanfaatkan Artificial Intelligence dalam meningkatkan kemampuan siswa. J Manag Islam Educ. 2023;4(3):229–40.

13. Ismail RN, Fauzan A. Exploring Self-Regulated Learning and Their Impact on Students' Mathematical Communication Skills on the Topic of Number Patterns With the Blended Learning System. J High Educ Theory Pract. 2023;23(16).

14. Ismail RN, Mudjiran N. Membangun karakter melalui Implementasi Teori Belajar behavioristik pembelajaran matematika berbasis kecakapan abad 21. Menara Ilmu J Penelit dan Kaji Ilm. 2019;13(11).

15. Hidayanti W, Azmiyanti R. Dampak Penggunaan Chat GPT pada Kompetensi Mahasiswa Akuntansi: Literature Review. Semin Nas Akunt dan Call Pap. 2023;3(1):83–91.

16. Akbar MF, Anggraeni FD. Teknologi Dalam Pendidikan : Literasi Digital dan Self-Directed Learning pada Mahasiswa Skripsi. Indig J Ilm Psikol. 2017;2(1):28–38.

17. Yilmaz MM, Siğirtmaç A. A material for education process and the Teacher : the use of digital storytelling in preschool science education. Res Sci Technol Educ. 2020;00(00):1–28.

18. Zhu D, Al Mahmud A, Liu W. Digital Storytelling Intervention for Enhancing the Social Participation of People With Mild Cognitive Impairment: Co-Design and Usability Study. JMIR Aging. 2024;7(1):1–20.

19. Schrum K, Majury N, Simonelli AL. Authentic learning across disciplines and borders with scholarly digital storytelling. Teach Learn Inq. 2021;9(2).

20. Rahiem MDH. Storytelling in early childhood education: Time to go digital. Int J Child Care Educ Policy. 2021;15(1).

21. Aliska Wulandari. Pengaruh Media Digital Storytelling terhadap Hasil Belajar Mahasiswa S-1 PBSI Universitas Jambi. 2019;2(2):15–29.

22. Çetin E. Digital storytelling in teacher education and its effect on the digital literacy of pre-service teachers. Think Ski Creat. 2021;39:100760.

23. Ismail RN, Yerizon AF. Students' Perception of the Digital Learning System for Junior High Schools in Padang, Indonesia. J Hunan Univ Nat Sci. 2023;50(1).

24. Ismail RN, Fauzan A, Yerizon. Analysis of students' motivation and self-regulation profiles in online mathematics learning junior high school at Padang city. In: AIP Conference Proceedings. AIP Publishing LLC; 2023. p. 60025.

25. Arnellis A, Syarifuddin H, Ismail RN. Optimizing students' mathematical critical and creative thinking skills through the flip-a-team model with e-learning. Al-Jabar J Pendidik Mat. 2023;14(1):133–40.

26. Carolina Y Dela. Augmented Reality sebagai Media Pembelajaran Interaktif 3D untuk Meningkatkan Motivasi Belajar Siswa Digital Native. Ideguru J Karya Ilm Guru. 2022;8(1):10–6.

27. Jasrial, Saputra A, Rifma. Improving learning outcomes: The effectiveness of ebook reading literacy based in learning management psychology. Cakrawala Pendidik. 2023;42(3):631–41.

28. Mak KK, Pichika MR. Artificial intelligence in drug development: present status and future prospects. Drug Discov Today. 2019;

29. Suparno P. Menyikapi Penggunaan Artificial Intelligence (AI, Kecerdasan Buatan) Dalam Pendidikan Fisika. Semin Pendidik Nas. 2019;1–12.

30. Chanda Halim, Hendri Prasetyo. Penerapan Artificial Intelligence dalam Computer Aided Instructure(CAI). J Sist Cerdas. 2018;1(1):50–7.

31. Nur M, Zulfa A, Muna KN. PEACE (Prospek Implementasi Artificial Intelligence) Dalam Natural Science Learning (NLS) Berbasis Augmented Reality (AR) di Sekolah. Semin Nas Pendidik Fis 2019. 2019;4(1):19–26.

32. Rustandi J, Francisco L. Penerapan Artificial Intelligence pada Aplikasi Chatbot sebagai Sistem Pelayanan dan Informasi Online pada Sekolah. 2023;04(03):421–30.

33. Heiden B, Tonino-Heiden B. Key to artificial intelligence (AI). Adv Intell Syst Comput. 2021;1252 AISC(2):647–56.

34. Andriyeni R, Zakir S. Analisis Penggunaan Artificial Intelligence Dalam Pemahaman Pembelajaran Fisika Di Sman 1 Ampek Angkek. J Ilm Res …. 2023;1(2).

35. Mutaqin FM, Jubaedah I, Koestianto H, Setiabudi DI. Efektif Artificial Intelligence (AI) dalam Belajar dan Mengajar. J Pendidik Seroja. 2023;2(1):53–60.

36. Masrichah S. Ancaman Dan Peluang Artificial Intelligence (AI). J Pendidik dan Sos Hum. 2023;3(3):83–101.

37. Angkasawan B, Putra S, Ramadhan MG, Andhika R. Dampak Perkembangan Teknologi Artificial Intelligence Terhadap Pelajar Dan Mahasiswa. Lensa. 2023;17(2):85–96.

38. Syarifuddin H, Riza Y, Harisman Y, Ismail RN. Students' Response to the Use of a Flipped Learning Model (FLM) in Abstract Algebra Course. In: Unima International Conference on Social Sciences and Humanities (UNICSSH 2022). Atlantis Press; 2023. p. 1435–41.

39. Fauzan A, Nasuha R, Zafirah A. The Roles of Learning Trajectory in Teaching Mathematics Using RME Approach. In: Proceedings of the 14th International Congress on Mathematical Education: Volume II: Invited Lectures. World Scientific; 2024. p. 197–209.

40. Ismail RN, Fauzan A, Arnawa M, Armiati A. Pengembangan Hypothetical Learning Trajectory Berbasis Realistics Mathematics Education Geometri Transformasi pada Topik Rotasi. Lattice J J Math Educ Appl. 2021;1(1):74–90.

41. Yerizon I, Ismail RN. Improving Student's Mathematical Communication Skills Through Mathematics Worksheet Based on Realistic Mathematics Education. 2020;

42. Saputra HN, Salim S, Idhayani N, Prasetiyo TK. Augmented Reality-Based Learning Media Development. AL-ISHLAH J Pendidik. 2020;12(2):176–84.

43. Borg WR, Gall D. Educational Research. New York: Longman; 1983. 569 p.

44. Yılmaz M, Uyar R, Sığırtmaç A. A thematic review of preschool science education research studies: Between the years of 2015-2019. Gazi Üniversitesi Gazi Eğitim Fakültesi Derg. 2020;40(2).

45. Yılmaz MM, Uyar RÖ, Sığırtmaç AD. Okul öncesi fen eğitimi alanında yapılan çalışmaların tematik içerik analizi: 2015-2019 yılları arası. Gazi Üniversitesi Gazi Eğitim Fakültesi Derg. 2020;40(2):553–89.

46. Çetin S, De Wolf C, Bocken N. Circular digital built environment: An emerging framework. Sustainability. 2021;13(11):6348.

47. Martin A. Digital literacy and the "digital society." Digit literacies Concepts, policies Pract. 2008;30(151):1029–55.

48. Bawden D. Information and digital literacies: a review of concepts. J Doc. 2001;57(2):218–59.

49. Nelson K, Courier M, Joseph GW. An investigation of digital literacy needs of students. J Inf Syst Educ. 2011;22(2):95–110.

50. Correia AMR. Information literacy for an active and effective citizenship. In: White Paper prepared for UNESCO, the US National Commission on Libraries and Information Science, and the National Forum on Information Literacy, for use at the Information Literacy Meeting of Experts, Prague, The Czech Republic. 2002.

51. Adam-Turner N. Digital Literacy Adoption with Academic Technology Namely Digital Information Literacy to Enhance Student Learning Outcomes? In: Society for Information Technology & Teacher Education International Conference. Association for the Advancement of Computing in Education (AACE); 2016. p. 1666–72.

52. Hake RR. Assessment of student learning in introductory science courses. PKAL Roundtable Futur Assess Serv student Learn Duke Univ March. 2002;1–3.

53. Azizah AL, Destini F, Hariyanto H. Development of Android-Based Interactive Multimedia in E-Learning. Edunesia J Ilm Pendidik. 2024;5(2):1189–203.

54. Ismail RN, Arnawa IM. Improving StudentsReasoning and Communication Mathematical Ability by Applying Contextual Approach of The 21st Century at A Junior High School In Padang. In: 2nd International Conference on Mathematics and Mathematics Education 2018 (ICM2E 2018). Atlantis Press; 2018. p. 144–9.

55. Muarif JA, Jihad FA, Alfadli MI, Setiabudi DI. Hubungan Perkembangan Teknologi Ai Terhadap Pembelajaran Mahasiswa. J Pendidik IPS. 2019;4(2):53–60.

56. Khoirurrijal K, Fadriati F, Sofia S, Anisa Dwi M, Sunaryo G, Abdul M, et al. Pengembangann Kurikulum Merdeka. 2022;

57. Mudrikah A, Khori A, Hamdani H, Holik A, Hakim LL, Yasmadi B, et al. Implementasi merdeka belajar kampus merdeka (MBKM) di Universitas Islam Nusantara. Islam Manag J Manaj Pendidik Islam. 2022;5(01):137–48.

58. Alrwaished N. Mathematics pre-service teachers' preparation program for designing STEM based lesson plan: enhanced skills and challenges. Cogent Educ. 2024;11(1).

59. Chan CKY, Lee KKW. The AI generation gap: Are Gen Z students more interested in adopting generative AI such as ChatGPT in teaching and learning than their Gen X and millennial generation teachers? Smart Learn Environ. 2023;10(1).

60. Novitasari Y, Fauziddin M. Analisis Literasi Digital Tenaga Pendidik pada Pendidikan Anak Usia Dini. J Obs J Pendidik Anak Usia Dini. 2022;6(4):3570–7.

61. Stamer I, David MA, Höffler T, Schwarzer S, Parchmann I. Authentic insights into science: scientific videos used in out-of-school learning environments. Int J Sci Educ. 2021;43(6):868–87.

62. Dhivya DS, Hariharasudan A, Nawaz N. Unleashing potential: Multimedia learning and Education 4.0 in learning Professional English Communication. Cogent Soc Sci. 2023;9(2):0–22.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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