

Design and development of a Randai-based animated learning video to enhance vocational students' creativity through Minangkabau local wisdom

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ARTICLE INFO

Article History

Received:

30 October 2024;

Revised:

24 December 2024;

Accepted:

5 January 2025;

Keywords

Animated learning video;

Creative thinking;

Environmental ethics;

Minangkabau local

wisdom;

Randai;

Vocational education

ABSTRACT

This study aims to design and develop an animated learning video integrating Randai, a traditional performing art rooted in Minangkabau local wisdom, as a culturally responsive learning medium to foster creativity among vocational students. In response to the limited use of innovative and culturally contextualized media in environmental ethics learning, this research employs a Research and Development (R&D) method using the 4D model: Define, Design, Develop, and Disseminate. During the Define stage, a needs analysis was conducted to align the video content with environmental impact materials. In the Design stage, a narrative script based on Randai was created, followed by the development of storyboards and video production using Powtoon. Expert validation was carried out in the Develop stage, and product testing involving vocational students occurred in the Disseminate phase. Research instruments included validation sheets, practicality questionnaires, and creativity assessments. Data were analyzed descriptively using percentage calculations. The results show that the developed animation video is considered valid by experts (89%) and highly practical by students (88%). Moreover, it significantly enhances students' creative thinking skills, particularly in fluency, flexibility, and originality. This study contributes to the field by demonstrating how local cultural heritage can be effectively integrated into digital learning media, supporting the development of 21st-century skills while promoting cultural preservation in vocational education contexts.

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INTRODUCTION

The rapid advancement of digital technology has transformed various dimensions of education, including the way learning materials are designed, delivered, and experienced by students. Technology-enabled instruction has been recognized as a critical driver for improving learning quality, as it assists learners in understanding complex concepts and enables teachers to present information more effectively (Kamsina, 2020; Said, 2023). In classroom settings, learning media serve an essential role in bridging instructional messages and learners' comprehension. Effective media can simplify abstract content, reduce cognitive load, equalize perceptions, enhance student attention, and make learning more efficient (Afifah et al., 2022; Leny et al., 2021). Consequently, the strategic selection and development of learning media are vital, particularly for instructional materials that aim to shape values, attitudes, and character.

One of the learning areas requiring contextual and experiential reinforcement is environmental ethics. As a character-oriented and concrete domain, environmental ethics ideally demands learning experiences that provide vivid, meaningful representations of moral and ecological messages. However, classroom practices often rely heavily on textual explanations, resulting in rote

memorization rather than conceptual understanding. Such an approach causes students to quickly forget the material and struggle to recall or apply ethical principles in real-life contexts. Moreover, the lack of innovative learning media further contributes to disengaging classroom environments. At the same time, global technological development has inadvertently contributed to diminishing appreciation for local cultural wisdom. While technological trends help shape digital culture positively, they also lead to reduced recognition and practice of traditional arts among students (Fakhri et al., 2023; Leksono et al., 2022).

Previous research has attempted to address these issues by developing various types of media, such as animated videos to increase learning interest (Ginting & Tamba, 2023; Sunami & Aslam, 2021), e-learning platforms (Maulana, 2019), problem-based interactive media in vocational education (Ismail et al., 2018), and web-based assessment tools (Heryani et al., 2022). Nevertheless, studies that integrate animated learning videos with local cultural wisdom remain largely unexplored. This gap underscores the need for culturally responsive instructional media that not only facilitate learning but also reinforce the value of traditional knowledge systems in contemporary education. Such integration is particularly important for vocational education, where character, creativity, and contextual understanding are essential components of 21st-century competencies.

One of the rich cultural traditions with strong philosophical and educational values is Randai, a traditional Minangkabau performing art combining music, movement, storytelling, and collective wisdom. Originating from communal folk activities, Randai conveys moral lessons through narratives, expressions, and coordinated performances, making it a powerful medium for value-based education (Suirta et al., 2022; Wardani & Endahati, 2019). Randai embeds local wisdom related to ethics, communal harmony, and life perspectives and is structured through storytelling techniques that connect actions, dialogues, and symbolic expressions (Khairunnisa, 2020; Lestari et al., 2020). Integrating Randai into animated video formats offers an opportunity to preserve cultural heritage while transforming it into an engaging digital learning medium that students can easily understand and relate to.

In addition to cultural considerations, fostering creativity is a critical objective in vocational education. Creativity is a core skill in the Industrial Revolution 4.0 era, enabling learners to synthesize ideas, make decisions, generate novel solutions, and produce innovative outputs. Creative abilities—fluency, flexibility, and originality—play an essential role in learners' capacity to solve problems and design new products relevant to vocational contexts (Alneyadi et al., 2023). Enhancing students' creativity requires instructional designs that stimulate imagination, provide meaningful visual cues, and encourage learners to reinterpret information through diverse perspectives. Animated videos based on culturally meaningful narratives therefore offer pedagogical spaces where creativity and cultural identity can mutually reinforce each other.

Considering these needs, integrating Randai into animated learning videos provides a promising innovation for environmental ethics instruction in vocational schools. Such media can contextualize moral messages through culturally familiar stories while visual animations make abstract concepts more concrete and engaging. Furthermore, the incorporation of local wisdom supports the preservation of traditional arts by adapting them into modern learning technologies accessible to younger generations. Thus, this study aims to design and develop a Randai-based animated learning video grounded in Minangkabau local wisdom and to examine its validity, practicality, and potential to enhance vocational students' creativity. This research contributes to the literature by demonstrating a culturally responsive digital learning innovation that supports 21st-century skill development while simultaneously strengthening cultural preservation efforts within vocational education.

METHOD

This study employed a research and development (R&D) approach, which is a methodological framework used to design, develop, and evaluate educational products in a systematic manner (Sugiyono, 2018). The development model adopted in this research is the Four-D Model, comprising the Define, Design, Develop, and Disseminate stages. The overall procedural

flow of the research is illustrated in Figure 1, which outlines the sequential steps undertaken to produce and validate the Randai-based animated learning video.

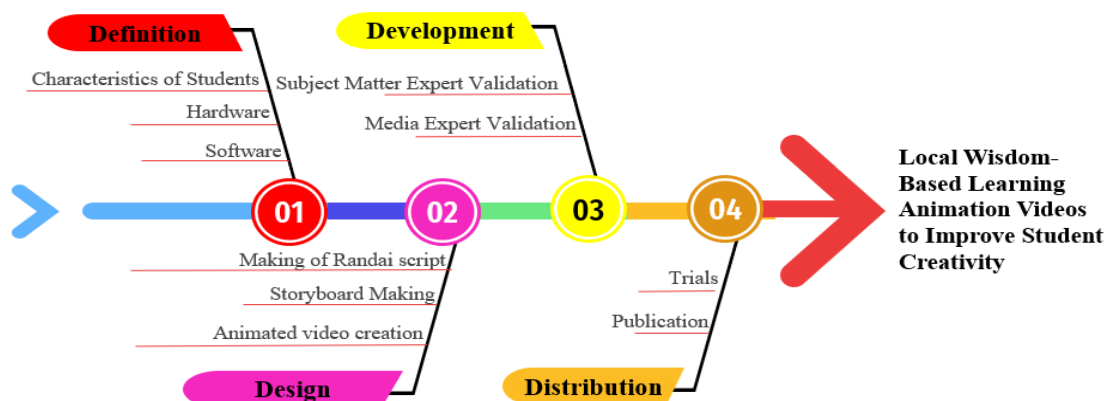


Figure 1. The 4D Development Model Workflow for Designing Randai-Based Animated Learning Videos

At the Define stage, a needs analysis was conducted to examine student characteristics as well as the availability of hardware and software required for product development. The analysis revealed that students showed enthusiasm toward technological advancements but possessed limited understanding of local wisdom, particularly Randai. The essential hardware included a laptop and mouse, while the software consisted of the Windows 10 operating system, Canva for collecting symbols, icons, and animation components, and Powtoon as the main application for video production.

The Design stage involved developing the structure and flow of the learning video. This process included drafting a Randai-based narrative script, creating manual sketches, and arranging a complete storyboard to visualize the sequence of scenes and animations. The Develop stage consisted of validating the initial product through expert review. The animated video design was evaluated by both material experts and media experts to determine its accuracy, suitability, and technical quality. Revisions were made based on feedback until the video met the criteria for validity. Following expert validation, a product trial was conducted with vocational students to assess the practicality of the Randai-based learning video in actual instructional settings.

The research employed several instruments to evaluate the product. The media expert validation sheet measured the quality of the video based on aspects related to design, communication, visualization, and software use. Indicators included accuracy and clarity of information, navigation, readability, animation quality, layout organization, interactivity, and originality. Meanwhile, the material expert validation sheet assessed the substance and appropriateness of the content presented in the video. Evaluation criteria included scientific accuracy, factual correctness, logical coherence, completeness of material, depth of exploration, connection to related subjects, descriptive quality, currency of examples, and clarity of language.

A practicality assessment was also administered to students to examine the functionality and usability of the learning video. Indicators observed included the attractiveness of visual and color elements, user engagement, efficiency in navigating the media, ease of understanding the language and material, clarity of the learning process, and suitability of time allocation for media use within the instructional context.

Data were analyzed using descriptive statistics through percentage calculations to determine the validity and practicality levels of the Randai-based animated video. The percentage score was computed using a standard formula comparing the total obtained score with the maximum possible score. The results were categorized according to predetermined validity and practicality criteria. A validity score between 90% and 100% indicated a very valid product, 80% to 89% valid, 65% to 79% moderately valid, 55% to 64% less valid, and $\leq 54\%$ very invalid. Similarly, practicality scores

between 86% and 100% classified the product as very practical, 76% to 85% practical, 60% to 75% sufficiently practical, 55% to 59% not practical, and $\leq 54\%$ very impractical.

RESULTS AND DISCUSSION

Results

The results of this study encompass the development of the Randai local wisdom-based animated learning video, including its visual design, expert validation, practicality testing, and the analysis of students' creativity outcomes. The final product is an animated learning video grounded in Minangkabau Randai traditions and contextualized to environmental ethics content. The introductory view of the animation is presented in Figure 2.



Figure 2. Initial View of Animation Video Based on Randai Local Wisdom

The opening scene displays the video title accompanied by a visual depiction of Randai performers in a natural setting, selected to reinforce the environmental theme and introduce students to the cultural atmosphere. As the narrative begins, the explanation of learning content is delivered through a Randai performance, illustrated in Figure 3.



Figure 3. Explanation of Material

A key feature of the animation is the presence of a teacher character acting as a tukang dendang, who narrates environmental ethics concepts through song. This approach integrates traditional Randai communication techniques with the instructional material. The performers then begin acting out their roles, forming a circle and executing galombang movements as part of the storytelling process, as depicted in Figure 4.



Figure 4. Players Start Playing Their Roles

Each performer enacts a specific role aligned with the learning theme. The narrative structure allows characters to take turns expanding on the content, creating an interactive and culturally immersive explanation of waste management. At the end of the video, the teacher summarizes the learning points—still accompanied by traditional drumming—to maintain cultural coherence, as shown in Figure 5.



Figure 5. Final Summary of Randai Material

The concluding segment reinforces the message that environmental ethics can be practiced through responsible waste management that supports a circular economy. Students are encouraged to internalize the moral value of working cooperatively to preserve the environment.

Validation of Instruments and Media

Data analysis began with the validation of the practicality questionnaire instrument. Item validity was assessed by comparing the calculated *r*-value with the *r*-table value at a significance level of 5%. Testing conducted with 29 respondents demonstrated that all items had *r*-count values exceeding the *r*-table threshold (0.367), indicating that all statement items were valid and appropriate for measuring practicality. Media validity was assessed by two expert validators, focusing on four aspects: substance of material, visual communication, design, and software utilization. The results are summarized in Table 1 and show that the animated video achieved an average validity score of 89%, falling into the “valid” category.

Table 1. Expert Validation Results

Assessment Aspect	Validator		Total	Validity Score (%)	Criteria
	1	2			
Substance of the material	12	9	21	80	Valid
Visual communication display	17	15	32	84	Valid
Design	25	26	51	94	Very valid
Software utilization	10	11	21	95	Very Valid
Average			125	89	Valid

Overall, the video met expert criteria for feasibility and continued to the practicality testing phase. Detailed evaluations are illustrated through Figures 6–9, which show expert judgments on material accuracy, visual clarity, design quality, and software use. Based on Table 1, it can be seen that the animated video based on Randai's local wisdom is declared valid by both validators so that it can be tested on students to determine its feasibility through the practicality test. In detail, the validator's assessment of the Randai local wisdom-based animated video for the substance of the material with a maximum rating of 3 as shown in Figure 6.

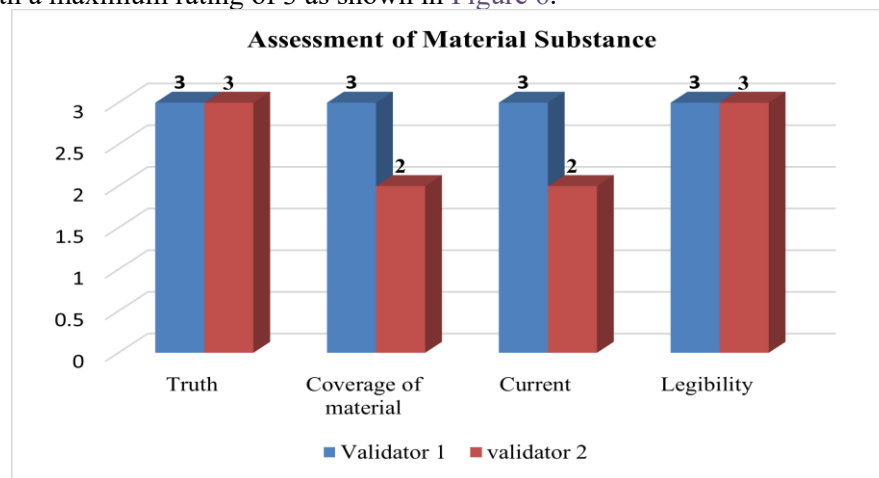


Figure 6. Validation Results on Material Substance

Figure 6 shows that the assessment given by validator 1 on the correctness of the substance of the material contained in the exam question shows the maximum score of 3, while validator 2 gave an assessment with a score of 2. This means that the truth of the material contained in the animation video based on local wisdom Randai can be trusted. Meanwhile, the material coverage and readability are classified as good. When viewed from the assessment of visual communication, it can be seen with a maximum assessment of 3 as shown in Figure 7.

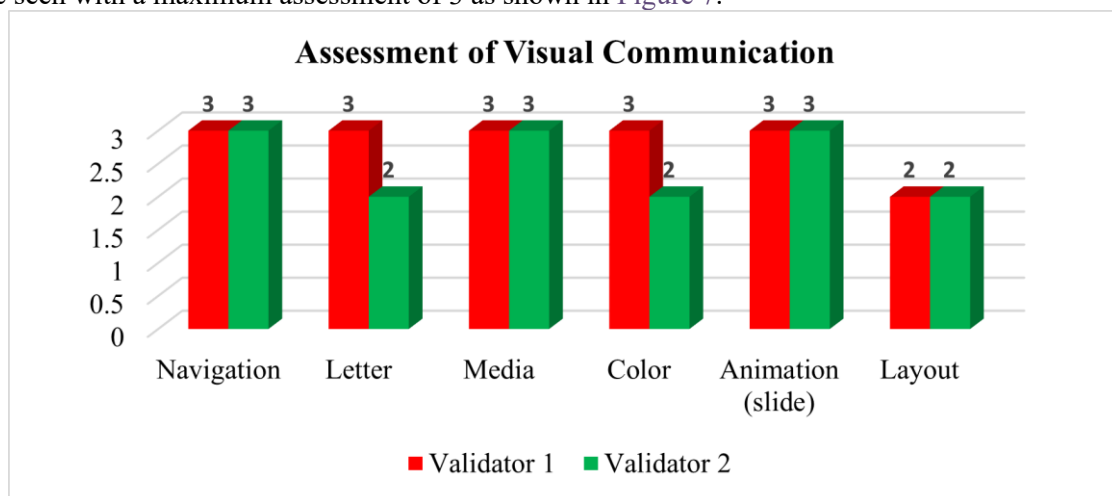


Figure 7. Validation Results on Visual Communication

Figure 7 shows that the selection of letters displayed in the animation video based on Randai local wisdom according to validator 2 is still classified as less firm and clear. The use of letters that are too varied makes students somewhat distracted in understanding the material. Therefore, the typeface used should be consistent and firm so that it makes it easier for students to read the material. The animation on the video gets the maximum score but the layout is still not proportional. Furthermore, the validator assessed the design with the highest rating of 4 as shown in Figure 8.

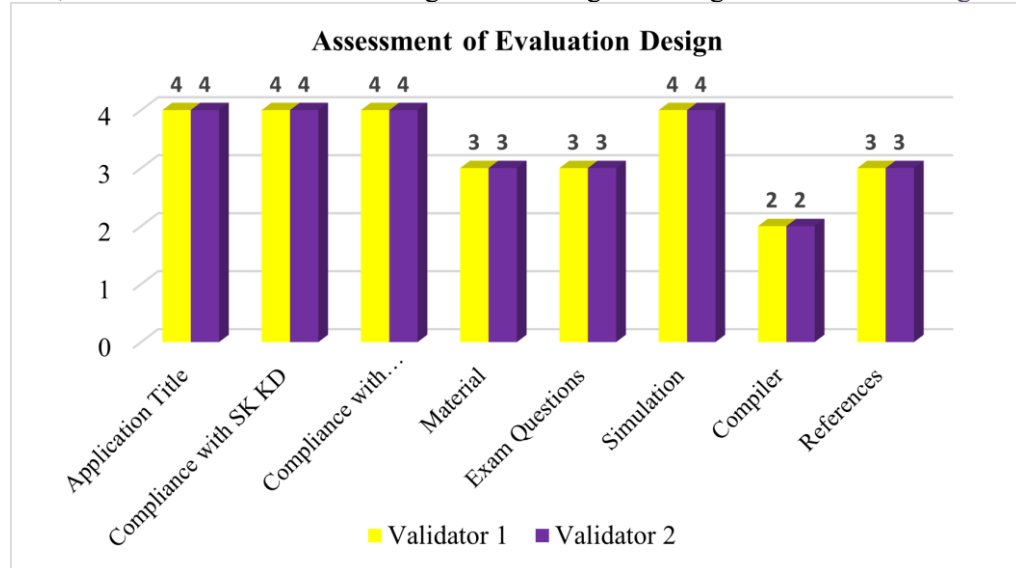


Figure 8. Validation Results on Design

Figure 8 outlines that the overall design of the Randai local wisdom-based animated video received the highest score by both validators. Therefore, the animated Vvideo can be tested on students. Furthermore, testing of the use of software is carried out as shown in Figure 9 with the highest rating of 4.

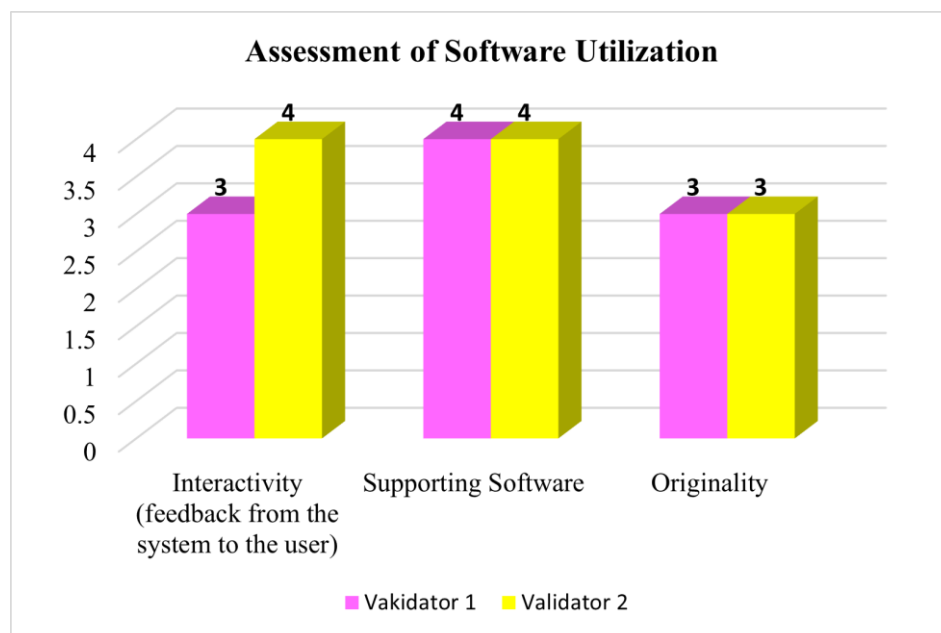


Figure 9. Validator's Assessment of Software Utilization

Practicality Test Results

Practicality testing involved 29 vocational students who used the animated video during learning. Their responses, presented in Figure 10, placed the video in the “very practical” category. Students responded positively to its attractiveness, clarity, usability, and time efficiency. The predominance of green tones in the animation was intentionally selected to create a calm and focused learning environment, consistent with findings by Khairunnisa and Ilmi (2020) that green supports mental relaxation and improves cognitive processing. Overall, students found the animation engaging, easy to navigate, and effective in helping them understand the material.

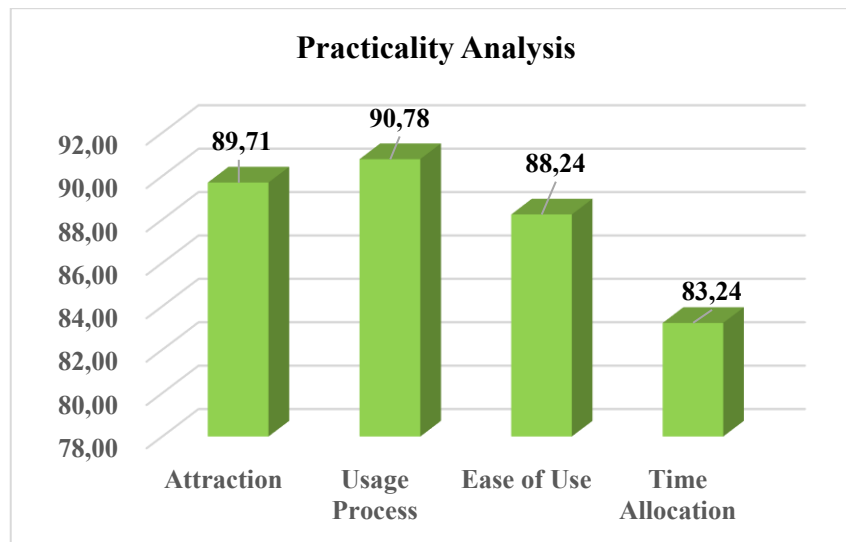


Figure 10. Practicality Analysis

Students' Creativity Outcomes

Creativity was evaluated through indicators of fluent thinking, flexible thinking, and original thinking. The results demonstrate notable increases in all three areas.

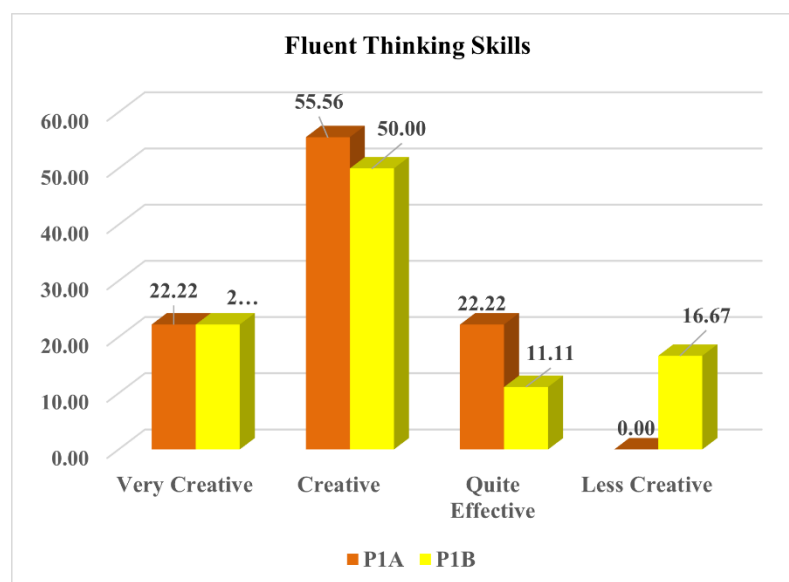


Figure 11. Percentage of Fluent Thinking Skills

More than 50% of students scored in the “very creative” or “creative” categories. They demonstrated an ability to generate many relevant ideas quickly and efficiently, suggesting that the

animated video effectively stimulated ideation. Based on Figure 11, it can be seen that in the sub-indicators of fluent thinking skills, more than 50% are “very creative” or “creative”, indicating that the learning process has gone well. Learners can (1) generate many relevant ideas and answers; (2) provide quick and precise responses; (3) think efficiently in solving problems; and (4) suggest many possible solutions. This fluency of thinking shows the learners' ability to create ideas quickly and diversely. Furthermore, flexible thinking skills were measured with the results as shown in Figure 12.

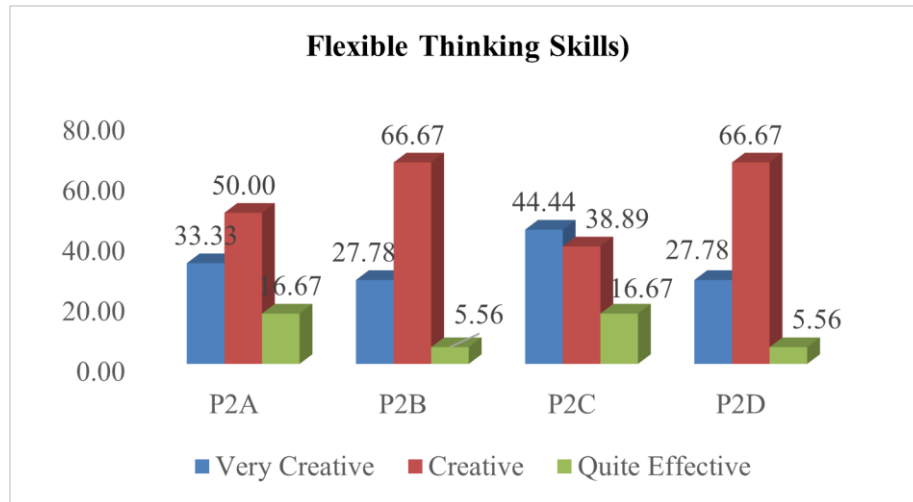


Figure 12. Percentage of Flexible Thinking Skills Indicators

The majority of students have good flexible thinking skills in producing various ideas, seeing problems from different perspectives, looking for alternatives or different directions and changing the approach or thinking. Flexible thinking skills are very necessary because students are expected not only to be passive recipients of knowledge, but also to be able to contribute with new ideas in their respective fields. This is also in line with the demands of the modern world of work which requires professionals to be able to innovate and adapt quickly.. This is in line with research Heriyanto et al. (2020) students who have flexible thinking skills are very adaptive in problem solving. While original thinking skills are seen in Figure 13.

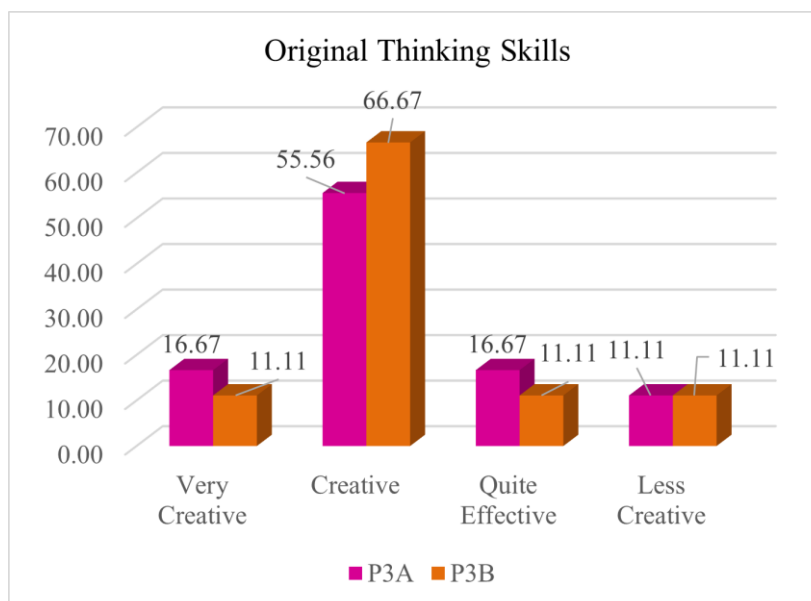


Figure 13. Percentage of Original Thinking Skills Indicator

Students exhibited good originality, producing unique ideas, combining concepts in novel ways, and expressing autonomous thinking. These findings correspond with Fitriani et al. (2019), who argue that creative environments encourage learners to express new and distinctive ideas.

Discussion

The findings of this study indicate that the Randai-based animated learning video developed using the 4D model is valid, practical, and effective in enhancing vocational students' creative thinking skills, particularly in terms of fluency, flexibility, and originality. These results reinforce previous research showing that technology-enhanced learning media can enrich learning experiences and make abstract or value-laden content easier to understand (Kamsina, 2020; Said, 2023). The positive response from students also aligns with studies demonstrating that innovative digital media—especially animation—can significantly increase engagement and comprehension (Dewi & Handayani, 2021; Fitri & Ardipal, 2021).

From an instructional design perspective, the Randai-based animation supports earlier findings that interactive and multimodal learning media help clarify concepts and stimulate students' attention, motivation, and cognitive involvement (Afifah et al., 2022; Suprihatin et al., 2022). Multimedia learning tools, when well-designed, can reduce cognitive load, enhance clarity, and provide meaningful learning experiences (Elmunyah et al., 2019; Rahmi et al., 2019). In this study, the animated storytelling elements of Randai contributed to a more immersive and contextualized learning process, consistent with studies emphasizing that culturally relevant media can improve learner engagement and comprehension (Suirta et al., 2022; Wardani & Endahati, 2019).

The improvement in students' creative thinking skills is also aligned with research highlighting the role of student-centred and media-rich environments in fostering creativity. Learning activities that encourage exploration, idea generation, and contextual interpretation are known to stimulate creative processes (Effendi, 2013; Fitriani et al., 2019; Vinchon et al., 2023). The Randai narrative structure—which requires interpreting roles, messages, and sequences—provides opportunities for students to connect new information with cultural meaning, helping them generate more fluent, flexible, and original ideas. This is consistent with Heriyanto et al. (2020), who notes that creative thinking emerges when students are exposed to learning situations that require problem-solving from multiple perspectives.

The incorporation of Minangkabau local wisdom adds an important sociocultural dimension. Cultural digitalization efforts, such as integrating traditional arts into learning technology, have been shown to strengthen identity, motivation, and appreciation of cultural heritage (Gusti et al., 2021; Rustiyanti et al., 2021). Similar to digitalization studies on Minangkabau silat and other performance arts (Fiandra et al., 2021; Lestari et al., 2020), this study demonstrates that transforming Randai into animated form can preserve cultural meaning while adapting it to modern educational contexts. The finding that students responded positively supports arguments that local wisdom-based media can improve relevance and learning resonance.

The high validity scores across material accuracy, visual communication, design quality, and software utilization indicate that the media met the expected standards of a well-developed instructional product. This aligns with the guidelines of media development research, which emphasize iterative validation to ensure both pedagogical soundness and usability (Sugiyono, 2018). The strong practicality results are also consistent with research showing that well-designed animation can make learning more enjoyable, accessible, and easier to internalize (Ginting & Tamba, 2023; Savitri & Manuaba, 2022; Siregar & Sukmawarti, 2022). The dominance of green colour in the video aligns with Khairunnisa and Ilmi (2020), who found that green enhances focus and supports a calm environment conducive to learning.

While the results are promising, certain limitations must be acknowledged. The study involved a relatively small sample from a single vocational school, limiting its generalizability. The descriptive design also restricts causal claims about effectiveness compared to other instructional strategies. Creativity assessment relied primarily on quantitative indicators; future studies may incorporate qualitative analyses for deeper insights. Future research could explore broader implementation across multiple schools, integrate the Randai-based media with other learning models (e.g., project-based learning, digital literacy programs, environmental campaigns), or

examine long-term impacts on students' cultural appreciation and creativity. Studies may also investigate how animated cultural media can be scaled across different regions and cultural traditions to support diverse learning needs.

Overall, this study demonstrates that developing animated learning media grounded in local cultural wisdom can create engaging, culturally resonant, and creativity-enhancing learning environments. These findings contribute to growing evidence that local culture-integrated digital media offer an innovative pathway for strengthening both learning outcomes and cultural preservation in vocational education.

CONCLUSION

This study concludes that the Randai-based animated learning video developed through the 4D model is valid, practical, and feasible for use in vocational learning settings. Expert validation confirmed strong quality in content accuracy, visual communication, design, and software utilization, while students rated the media as highly engaging and easy to use. The implementation of the video contributed to improved creative thinking skills showing that embedding local cultural wisdom into digital media can effectively support both learning outcomes and cultural preservation. These findings highlight the potential of culturally grounded animation as an innovative learning resource in vocational education.

REFERENCES

- Afifah, N., Kurniawan, O., & Noviana, E. (2022). Pengembangan media pembelajaran interaktif pada pembelajaran Bahasa Indonesia kelas III sekolah dasar. *Jurnal Kiprah Pendidikan*, 1(1), 33–42. <https://doi.org/10.33578/kpd.v1i1.24>
- Alneyadi, S., Abulibdeh, E., & Wardat, Y. (2023). The impact of digital environment vs. traditional method on literacy skills; Reading and writing of Emirati fourth graders. *Sustainability*, 15(4), 3418. <https://doi.org/10.3390/su15043418>
- Dewi, F. F., & Handayani, S. L. (2021). Pengembangan media pembelajaran video animasi en-alter sources berbasis aplikasi Powtoon materi sumber energi alternatif sekolah dasar. *Jurnal Basicedu*, 5(4), 2530–2540. <https://doi.org/10.31004/basicedu.v5i4.1229>
- Effendi, M. (2013). Integrasi pembelajaran active learning dan internet-based learning dalam meningkatkan keaktifan dan kreativitas belajar. *Nadwa: Jurnal Pendidikan Islam*, 7(2), 283–309. <https://journal.walisongo.ac.id/index.php/Nadwa/article/view/563>
- Elmunsyah, H., Hidayat, W. N., & Asfani, K. (2019). Interactive learning media innovation: Utilization of augmented reality and pop-up book to improve user's learning autonomy. *Journal of Physics: Conference Series*, 1193, 012031. <https://doi.org/10.1088/1742-6596/1193/1/012031>
- Fakhri, M. M., Ainun Zahra Adistia, Jumadil Ahmad Safi'i, Rezka Haris, & Awaluddin Yunus. (2023). Designing Digital Mading Information and Communication System (DMICS) as a website-based trusted information provider and management service. *Journal of Embedded Systems, Security and Intelligent Systems*, 158–167. <https://doi.org/10.59562/jessi.v4i2.1118>
- Fiandra, Y. A., Jalinus, N., Refdinal, R., Anwar, M., & Waskito, W. (2021). TVET leadership in the education 4.0: Characteristics, opportunities and challenges. *Jurnal Pendidikan Tambusai*, 5(3), 8079–8091. <https://jptam.org/index.php/jptam/article/download/2303/1999>
- Fitri, F., & Ardipal, A. (2021). Pengembangan video pembelajaran menggunakan aplikasi kinemaster pada pembelajaran tematik di sekolah dasar. *Jurnal Basicedu*, 5(6), 6330–6338. <https://doi.org/10.31004/basicedu.v5i6.1387>

- Fitriani, R., Surahman, E., & Azzahrah, I. (2019). Implementasi pembelajaran berbasis proyek untuk meningkatkan kemampuan berpikir kritis siswa. *Quagga : Jurnal Pendidikan Dan Biologi*, 11(1), 6–11. <https://doi.org/10.25134/quagga.v11i1.1426>
- Ginting, Y. A. B., & Tamba, R. (2023). Pengembangan media pembelajaran video animasi berbasis aplikasi Inshot pada tema 5 Kelas II SDN 040556 Juhar. *JURNAL RISET RUMPUN ILMU PENDIDIKAN*, 2(2), 272–287. <https://doi.org/10.55606/jurripen.v2i2.1687>
- Gusti, U. A., Islami, A., Ardi, A., Almardiyah, A., Rahayu, R. G., & Tananda, O. (2021). Tinjauan penyebaran tradisi lisan di Sumatera Barat. *Jurnal Adat Dan Budaya Indonesia*, 3(1), 1–5. <https://doi.org/10.23887/jabi.v3i1.39261>
- Heriyanto, H., Zaenuri, Z., & Walid, W. (2020). Analisis kemampuan berpikir kreatif siswa sekolah menengah pertama. *PRISMA, Prosiding Seminar Nasional Matematika*, 3, 587–590. <https://journal.unnes.ac.id/sju/prisma/article/view/37716>
- Heryani, A., Pebriyanti, N., Rustini, T., & Wahyuningsih, Y. (2022). Peran media pembelajaran berbasis teknologi dalam meningkatkan literasi digital pada pembelajaran IPS di SD kelas tinggi. *Jurnal Pendidikan*, 31(1), 17–28. <https://doi.org/10.32585/jp.v31i1.1977>
- I. M. Suirta, I. K. Gading, & N. K. Suarni. (2022). Pengembangan media pembelajaran interaktif berbasis Android berorientasi kearifan lokal pada muatan IPA topik benda tunggal dan campuran. *PENDASI: Jurnal Pendidikan Dasar Indonesia*, 6(2), 91–101. https://doi.org/10.23887/jurnal_pendas.v6i2.1194
- Ismail, M. E., Utami, P., Ismail, I. M., Khairudin, M., Amiruddin, M. H., Lastariwati, B., & Maneetien, N. (2018). The effect of an augmented reality teaching kit on visualization, cognitive load and teaching styles. *Jurnal Pendidikan Teknologi Dan Kejuruan*, 24(2), 178–184. <https://doi.org/10.21831/jptk.v24i2.20031>
- Kamsina, K. (2020). Integrasi teknologi dalam pembelajaran implementasi pembelajaran ilmu teknologi dan masyarakat. *Edueksos: Jurnal Pendidikan Sosial & Ekonomi*, 9(2). <https://doi.org/10.24235/edueksos.v9i2.7103>
- Khairunnisa, A. (2020). *Representasi nilai-nilai karakter masyarakat Minangkabau pada film Surau dan Silek* [Universitas Medan Area]. <https://repository.uma.ac.id/bitstream/123456789/12262/2/168530007 - Ayu Khairunnisa - Fulltext.pdf>
- Khairunnisa, G. F., & Ilmi, Y. I. N. (2020). Media pembelajaran matematika konkret versus digital: Systematic literature review di era revolusi industri 4.0. *Jurnal Tadris Matematika*, 3(2), 131–140. <https://doi.org/10.21274/jtm.2020.3.2.131-140>
- Leksono, M. L., Alika, S. D., & Sultoni, A. (2022). Pengembangan model pembelajaran berbasis proyek (problem based learning) dengan video budaya cowongan berbasis kearifan lokal pada keterampilan menulis teks ekplanasi kelas XI SMA di Kabupaten Banyumas. *Jurnal Pendidikan Bahasa Dan Sastra Indonesia*, 11(2), 105–111. <https://journal.unnes.ac.id/sju/jpbsi/article/view/60573>
- Leny, L., Husna, K., Rusmansyah, R., Kusasi, M., Syahmani, S., & Zuwida, H. (2021). Development of flipbook e-module Problem-Based Learning (PBL) learning model to increase students' learning outcomes in oxidation-reduction reaction material. *Journal of Physics: Conference Series*, 2104(1), 012024. <https://doi.org/10.1088/1742-6596/2104/1/012024>
- Lestari, T., Gusman, T., Defni, D., & Ikhsan, M. Y. (2020). Aplikasi digitalisasi seni bela diri silat tradisional Minangkabau. *Jurnal Ilmiah Poli Rekayasa*, 16(1), 51–60. <https://doi.org/10.30630/jipr.16.1.193>
- Maulana, A. (2019, May 22). Padang Pariaman luncurkan program Lapau Emak 20 Juni. *Antaranews.Com*. <https://www.antaranews.com/berita/881624/padang-pariaman-luncurkan-program-lapau-emak-20-juni>

- Rahmi, M. S. M., Budiman, M. A., & Widyaningrum, A. (2019). Pengembangan media pembelajaran interaktif Macromedia Flash 8 pada pembelajaran tematik tema pengalamanku. *International Journal of Elementary Education*, 3(2), 178–185. <https://doi.org/10.23887/ijee.v3i2.18524>
- Rustiyanti, S., Listiani, W., Sari, F. D., & Surya Peradantha, I. (2021). Ekranisasi AR PASUA PA: dari seni pertunjukan ke seni digital sebagai upaya pemajuan kebudayaan. *Mudra Jurnal Seni Budaya*, 36(2), 186–196. <https://doi.org/10.31091/mudra.v36i2.1064>
- Said, S. (2023). Peran teknologi digital sebagai media pembelajaran di era abad 21. *Jurnal PenKoMi: Kajian Pendidikan Dan Ekonomi*, 6(2), 194–202. <https://jurnal.stkipbima.ac.id/index.php/PK/article/view/1300>
- Savitri, K. P. B., & Manuaba, I. B. S. (2022). Pengembangan video animasi berbasis model pbl sebagai media pembelajaran muatan Bahasa Indonesia untuk siswa kelas V. *Jurnal Pendidikan Dan Konseling (JPDK)*, 4(2), 344–354. <https://journal.universitaspahlawan.ac.id/index.php/jpdk/article/view/4070>
- Siregar, L., & Sukmawarti, S. (2022). Pengembangan media video animasi berbasis sparkol videoscribe pada pembelajaran IPS di SD. *Journal Pusat Studi Pendidikan Rakyat*, 2(1), 11–21. <https://pusdikra-publishing.com/index.php/jies/article/view/411/355>
- Sugiyono, S. (2018). *Metode penelitian kuantitatif, kualitatif dan kombinasi (mixed methods)*. Alfabeta.
- Sunami, M. A., & Aslam, A. (2021). Pengaruh penggunaan media pembelajaran video animasi berbasis Zoom Meeting terhadap minat dan hasil belajar IPA siswa sekolah dasar. *Jurnal Basicedu*, 5(4), 1940–1945. <https://doi.org/10.31004/basicedu.v5i4.1129>
- Suprihatin, T., Pritandhari, M., & Dewi, T. A. (2022). Pengembangan media pembelajaran interaktif ips terpadu berbasis articulate storyline kelas VIII Smp Muhammadiyah 3 Metro. *EDUNOMIA: Jurnal Ilmiah Pendidikan Ekonomi*, 3(1), 93–105. <https://doi.org/10.24127/edunomia.v3i1.2887>
- Vinchon, F., Lubart, T., Bartolotta, S., Gironnay, V., Botella, M., Bourgeois-Bougrine, S., Burkhardt, J., Bonnardel, N., Corazza, G. E., Glăveanu, V., Hanchett Hanson, M., Ivcevic, Z., Karwowski, M., Kaufman, J. C., Okada, T., Reiter-Palmon, R., & Gaggioli, A. (2023). Artificial intelligence & creativity: A manifesto for collaboration. *The Journal of Creative Behavior*, 57(4), 472–484. <https://doi.org/10.1002/jocb.597>
- Wardani, S., & Endahati, N. (2019). Animasi media pembelajaran bermuatan kearifan lokal. *Seri Prosiding Seminar Nasional Dinamika Informatika*, 3(1), 68–73. <https://senadi.upy.ac.id/prosiding/index.php/senadi/article/view/106/0>