

Development of interactive e-books on creative dance to enhance middle school students' appreciation of art

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ABSTRACT

The development of the digital globalisation era demands that teachers adapt to technology, including in the creation of dance teaching materials that require visualisation and interactive experiences. Conventional media such as printed books are less effective because they lack visual or audio elements, limiting students' understanding of movements, floor patterns, and the meaning of dance. Previous studies only focused on text or single videos, so interactive e-books for creative dance materials are needed because they can provide contextual, attractive learning that aligns with the characteristics of the digital generation. This study aims to develop a multimedia-based interactive dance e-book (including video, audio, animation, and interactive quizzes) using the 4D model. The research method used validation sheets, quantitative descriptive analysis, and limited trials on 30 students of class IX at SMP Negeri 10 Madiun. The validation results showed an average score of 3.42, categorised as very valid. Meanwhile, student responses showed high appreciation for observation aspects at 92%, internalization at 90%, and meaning-making and critical assessment at 87%. It is concluded that the interactive e-book is effective in facilitating dance comprehension, increasing motivation, art appreciation, and learning engagement. Its effectiveness in enhancing art appreciation averaged 11.8% with a normalised n-gain score of 0.46, categorised as medium. Substantively, this study is able to improve cognitive understanding, strengthen students' art appreciation, affective, and psychomotor skills, thus serving as an adaptive cultural art learning medium in the digital era.

INTRODUCTION

Digital technology is rapidly transforming various sectors, including education. Educational institutions are now integrating technology to create interactive and flexible learning for the digital generation. Technology-based learning media, such as interactive e-books, have become one of the relevant innovations in supporting more adaptive and engaging learning for students (Restiani et al., 2022). The development of the current digital globalisation era has entered the school environment, requiring teachers to adapt to technological advancements, so teachers must have the ability to adapt to technological progress, even by using smartphones to create teaching

materials. In addition to functioning as a receiver and sender of messages, this ebook has more features to help people carry out their activities (Manyeredzi & Mpofu, 2022). Nowadays, mobile phones are more sophisticated and have features matching human needs (Iqbal & Bhatti, 2020). This device always has all human desires. Additionally, it offers most of the features of modern Android smartphones.

Research by Zawacki-Richter et al (2019) shows that deep learning in education supports the personalisation of learning and significantly enhances student engagement. Furthermore, deep learning-based learning systems can also be used to create learning paths tailored to students' performance (Hwang et al., 2020). Therefore, the development of interactive e-books with multimedia features and the potential integration of artificial intelligence plays a crucial role in improving the quality of art education, especially for content that requires visual and kinesthetic understanding, such as creative dance. Masitoh & Utomo (2024) explicitly identify that one of the constraints in conventional creative dance learning is the lack of interactive media relevant to the students' world.

The results of interviews with two Arts and Culture teachers and 30 ninth-grade students at SMP Negeri 10 Madiun, conducted on June 23, 2025, through the distribution of a response questionnaire where the questions provided had definite answer choices; 'Yes' as the positive response and 'No' as the negative response, found that the learning process tends to be less effective because the printed teaching materials used do not contain visual or audio elements, such as motion illustrations, demonstration videos, or music accompaniment for dance. This causes students to struggle to understand movement techniques and the meaning of dance thoroughly. Moreover, the diverse conditions of the students, including their dance backgrounds, levels of kinaesthetic understanding, and learning styles, can affect how they absorb information through conventional media. Their diverse learning styles result in varied understanding of the material. Compared to those who are used to learning verbally or auditorily, students who require visual and auditory stimulation tend to experience more difficulties. As a result, the potential of each student may not have been fully explored. This potential includes the ability to develop movement, understand rhythm, embody character, collaborate, and develop creative dance skills.

Conventional learning media, such as printed books and verbal explanations, are starting to be less capable of meeting the learning needs of the current generation accustomed to visual, interactive, and technology-based information. Meisusanti et al (2023), showed that the limitations of conventional media in presenting complex dance materials affect students' understanding and interest. Many students appear passive, uninterested in textbooks, and prefer to seek material from the internet or other digital media that they find more engaging. Teachers also complain about the difficulty of conveying aesthetic values and dance expressions verbally without visual aids. This situation reinforces the urgency of innovative learning media that can bridge the needs of students with the characteristics of dance art material that requires visualization and interactive experiences. Yuliana et al (2022) emphasised that the use of interactive multimedia can enhance students' appreciation of art through a more meaningful visual and auditory learning experience. This is reinforced by Pratiwi et al (2025) developed e-modules based on local culture, which are proven effective in increasing student interest in art materials. Furthermore, Astuti & Puspito (2020) demonstrated that the use of interactive PowerPoint alone was able to improve student learning outcomes in dance material. These various findings concluded that interactive digital-based learning media are proven to be effective in enhancing students' understanding, interest, and appreciation in various fields of study, including art. However, few studies have specifically developed interactive multimedia-based e-books for creative dance materials at the junior high school level that combine text, video, illustrations, regional music audio, and evaluative quizzes in an integrated learning media.

The observations by the researchers on the empirical conditions in the field suggest that conventional learning media have not been able to optimally meet students' learning needs. The lack of visual and audio elements in printed books makes it difficult for students to understand dance movements comprehensively and decreases their motivation to engage actively in the learning process. The researchers recognise the empirical conditions in the field and then design teaching materials in the form of an interactive e-book equipped with multimedia features such

as video demonstrations of movements, accompanying music audio, illustrative animations, and interactive quizzes. The interactive e-book developed in this research is specifically designed to support Cultural Arts learning, particularly on the subject of creative dance. The learning will be applied using a Project-Based Learning (PjBL) approach that highlights exploratory and collaborative activities. This approach can encourage students to actively construct understanding and learning experiences contextually, thereby fostering an appreciation for the arts.

This e-book is structured in a flexible and responsive digital format, allowing access through various devices, including computers, tablets, or smartphones. Various multimedia features are included to enhance student understanding, such as demonstration videos of dance movements, accompanying music audio, animations, and supporting illustrations. Additional features such as interactive quizzes, practice questions, and the integration of QR Codes and hyperlinks to tutorial videos and online references enable students to learn more independently, adaptively, and enjoyably (Usfinit et al., 2025). The user-friendly navigation design and the use of language appropriate for the understanding level of junior high school students make this e-book an effective learning medium. With these characteristics, this interactive e-book is expected to serve as an innovative learning tool that improves conceptual and technical understanding of creative dance and strengthens students' appreciation of Indonesian cultural arts (Rahmah et al., 2024).

Based on the causal and interconnected background, this research aims to develop interactive e-book teaching materials on multimedia-based creative dance that can enhance students' appreciation of the arts. This research contributes to innovative cultural arts learning media, and its use during the learning process is considered more flexible and practical. This interactive e-book is a learning media designed to help students recognise, understand, and appreciate dance as part of the national cultural identity, as well as to clarify abstract learning processes in the future. Students are expected to become more independent, increase their interest, motivation, and enthusiasm for reading. This research is also expected to guide the development of digital learning media in cultural arts.

METHOD

This Research and Development employed the 4D (Define, Design, Develop, Disseminate) model (Riduwan, 2013). The research was conducted in the first semester of 2025 at SMP Negeri 10 Madiun and the Postgraduate Program of Universitas Negeri Surabaya. The subjects of the research were 30 heterogeneously-selected ninth-grade students. The development steps include: (1) Define, which involves analysis of curriculum, learners, materials, and learning tasks; (2) Design, which is the design of interactive e-book content with multimedia features; (3) Develop, which includes validation by subject matter and media experts; and (4) Disseminate, which involves publishing research results in the form of scientific articles. A depiction of the development steps is shown in Figure 1.

Figure 1 is the steps in the development of the e-book, where the Define stage aims to formulate the initial needs of the students and determine the focus of the learning materials. Then, the Design stage aims to produce an initial draft of the learning media that aligns with the characteristics of the material and the students. The Develop stage was carried out by preparing draft I, followed by a revision and validation process by two expert lecturers. This validation results in draft III, which was ready for testing. The Disseminate stage is the final stage, which was a limited trial to the students and the preparation of the final product. This stage aims to refine the interactive e-book before publication.

The research instrument consists of a validation sheet using a Likert scale to assess the feasibility aspects of presentation, content, and language. Validity data was obtained based on the assessment results from two validators, namely a media expert and an art dance content expert. The criteria for the Likert scale are presented in the Table 1. Table 1 is the scale used as a reference for the interactive e-book validation data analysis. The technique employed a descriptive quantitative approach based on the average validation scores and qualitative interpretation. The average validity score of all aspects is used to determine the validity level of the interactive e-book. The obtained values are interpreted based on validity interpretation as shown in Table 2.

The data analysis technique for the interactive e-book validation in [Table 2](#) shows that the developed interactive e-book is considered valid, feasible, and can be used in learning activities if the average score reaches ≥ 2.51 . The effectiveness of the e-book can be measured by the responses of the learners. The results of a limited trial with 30 learners were obtained from their responses on a response sheet with answers 'Yes' and 'No' for each question that has been interpreted into Guttman scale score criteria (see [Table 3](#)), where choosing 'Yes' gives a score of 1 and choosing 'No' gives a score of 0. Based on the results of the questionnaire analysis, a percentage value was obtained and then interpreted using [Table 4](#).

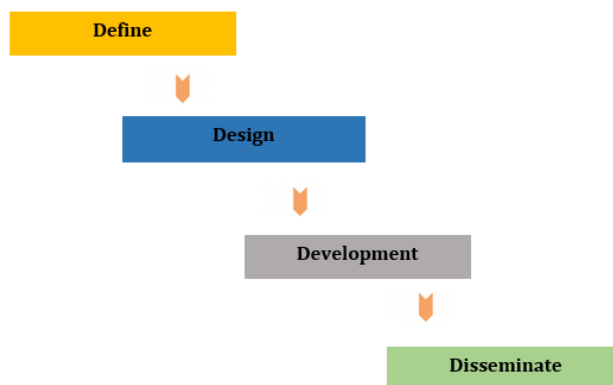


Figure 1. Steps in the development of interactive e-books

Table 1. Likert scale criteria

Assessment	Scale Value
Poor	1
Adequate	2
Good	3
Very Good	4

(Source: [Riduwan, 2013](#))

Table 2. Criteria for interpreting data from validation results

Scale value	Category
3,26 – 4,00	Very valid
2,51 – 3,25	Valid
1,76 – 2,50	Rather Valid
1,00 – 1,75	Less Valid

(Source: [Riduwan, 2013](#))

Table 3. Guttman scale criteria

Answer	Score
Yes	1
No	0

(Source: [Riduwan, 2013](#))

Table 4. Criteria for interpreting media effectiveness

Score (%)	Interpretation criteria
86%-100%	Very good
71%-85%	Good
51%-70%	Fairly good
26%-50%	Not good
0%-25%	Bad

(Adapted from [Ratumanan & Laurens, 2011](#))

Based on the [Table 4](#), a media is effective if it achieves a questionnaire percentage with an interpretation of $\geq 71\%$. The effectiveness of the e-book is also measured from the results of the students' pre-tests and post-tests. The effectiveness of the interactive e-book is based on the percentage of students who passed the minimum knowledge test scores. The scores are calculated using the following [Formula 1](#).

$$\frac{c}{n} \times 100 \quad (1)$$

- c = correct answer score
- n = total score

The analysis results are interpreted for mastery in accordance with the minimum mastery criteria set by the school. Students are considered to have mastered the material if their test score is ≥ 75 . The obtained calculation results are then interpreted using the criteria in [Table 5](#).

Table 5. Criteria for Interpreting Learning Achievement Mastery.

Average Score (%)	Category
0 – 40	Very poor
41 – 55	Poor
56 – 70	Fair
75 – 85	Good
86 – 100	Very good

(Source: [Riduwan, 2013](#))

Classically, a class is deemed complete if 75% of students achieve a score greater than 75. The improvement in students' learning outcomes after receiving treatment can be determined using the normalised gain score (g) with the following [Formula 2](#). The normalised gain score data was then analysed using the categories in [Table 6](#). Students are said to have experienced an improvement in understanding the material if their test scores increase, even though they have not yet reached the Learning Achievement Mastery set by the school.

$$g = \frac{(S \text{ posttest}) - (S \text{ pretest})}{S_{\text{maks}} - (S \text{ pretest})} \quad (2)$$

- g = normalised gain score
- S posttest = posttest score
- S pretest = pretest score
- S maks = maximum score

Table 6. Normalised gain score category (g).

Score	Category
$(g) > 0,7$	High
$0,3 > (g) > 0,7$	Medium
$(g) < 0,3$	Low

RESULT

The research conducted from January to June 2025 produced an interactive e-book that can enhance the appreciation of art among ninth-grade students at SMP Negeri 10 Madiun. The interactive e-book on creative dance materials includes several sub-chapters. These include definitions, characteristics and types of creative dance, elements of beauty in dance movements, basic elements of dance movements, steps to create simple creative dance movements, as well as examples of creative dances along with their aesthetic values.

Interactive e-book on creative dance art content

The developed interactive e-book consists of a cover, introductory pages, preface, table of contents, usage instructions, concept map, learning objectives, teaching materials, evaluations, bibliography, and glossary. Figures 2a, 2b, and 2c show the appearance of the interactive e-book designed using Flip PDF Professional, which can be used interactively and flipped like a regular printed book. The e-book includes the background of values, types, and functions of dance, as well as various forms of presentation, both individual and group, using the main and supporting elements of dance.

Results of validation and effectiveness of interactive e-book

A validation was carried out by one subject matter expert lecturer and one media expert lecturer. The recapitulation of the e-book validation results is in Figure 3. The overall average score of the recapitulation of the validation results in Figures 3a, 3b, and 3c, conducted by two validators, is 3.42, which falls under a very valid interpretation. In terms of the feasibility of presentation, it scored 3.48; content feasibility scored 3.44; and linguistic feasibility scored 3.34. This number indicates that the developed e-book is suitable for learning.

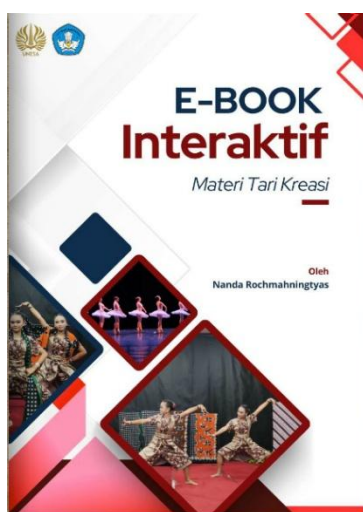


Figure 2a. Cover of the intractive e-book

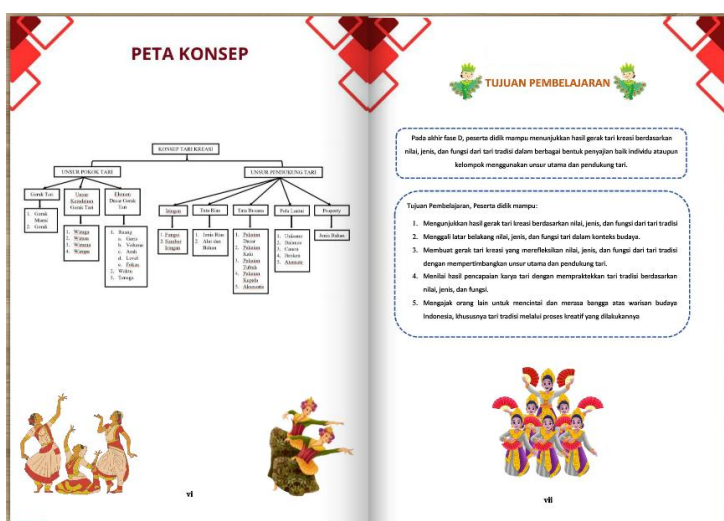


Figure 2b. The display of the concept map and learning objectives in the interactive e-book



Figure 2c. The display of dance art materials along with learning videos that can be accessed through a QR Code

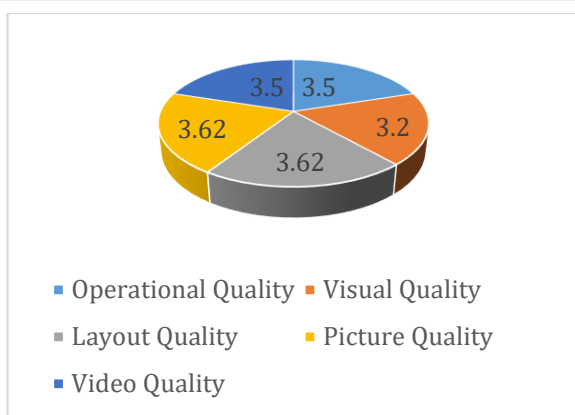


Figure 3a. Recapitulation of the validation results of the interactive e-book on the aspect of presentation

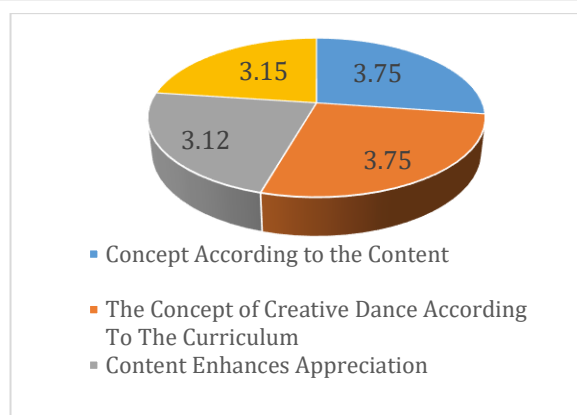


Figure 3b. Recapitulation of the validation results of the interactive e-book on the aspect of content

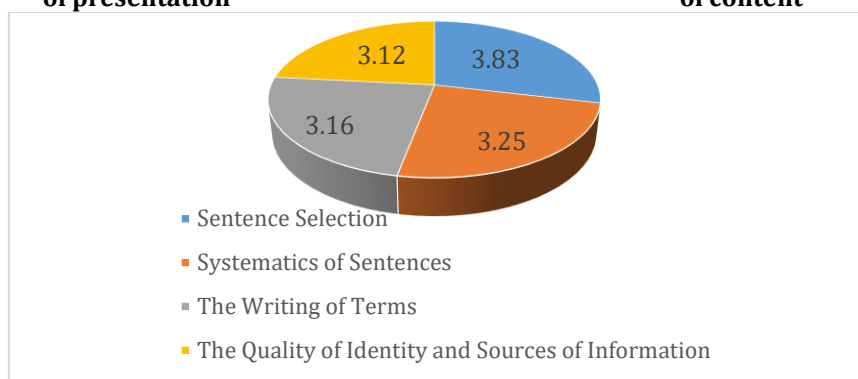


Figure 3c. Recapitulation of the validation results of the interactive e-book on the aspect of linguistic

The effectiveness of the interactive e-book is assessed through the students' response sheets. The recap of the response results through the appreciative learning syntax is in [Figure 4](#). The results of a limited test on 30 students conducted through response sheets at the stages of appreciative learning, which includes observation, appreciation, meaning, and critical assessment, found that the observation aspect received the highest percentage of 92%, indicating that students were able to pay close attention to the display, images, and layout of the e-book as well as to explore the available features. The appreciation aspect scored 90%, which includes student involvement, comfort, and enthusiasm in the process of appreciating dance arts through interactive quizzes. Furthermore, both the meaning and critical assessment aspects scored 87%, indicating that students were able to understand the material of creative dance by relating it to their prior knowledge and were capable of evaluating and concluding based on the facts obtained through the interactive e-book. The results show that the developed e-book media is effective in supporting the comprehensive process of appreciative learning in dance art ([Nita & Wati, 2024](#)). The effectiveness of the interactive e-book is also assessed through pre-tests and post-tests. The [Figure 5](#) presents a recapitulation of the pre-test and post-test results through appreciative learning syntax.

The effectiveness of interactive e-books in enhancing art appreciation is evident in the learning completeness results based on students' pretest and posttest scores. [Figure 5](#) indicates an increase in the percentage of student learning outcomes in all four aspects: for observation, the pretest percentage of 72.1% was in the 'fair' category and increased to 82.9%, which falls under the 'effective' category; for the appreciation aspect, an increase in percentage from 72.4% in the 'effective' category to 86.3% in the 'very effective' category; in the meaning aspect, the pretest percentage of 76.8% in the 'effective' category increased to 88.3% in the 'very effective' category; in the critical assessment aspect, the percentage increased from 75.6% in the 'effective' category to 86.7% in the 'very effective' category. This was then confirmed by calculating the normalised gain score to determine the criteria for the improved students' understanding of art appreciation,

as presented in Figure 6. Figure 6 presents the improvement in students' learning outcomes from the results of the pre-test and post-test using the normalised gain score (g).

Figure 6 shows an increase in students' art appreciation based on the calculation of normalised gain. In the observation aspect, it reached 0.39, which falls under the moderate category. The appreciation aspect scored 0.51, which is classified as moderate. The meaning aspect scored 0.50, also in the moderate category. In the critical assessment aspect, it scored 0.46, categorised as moderate.

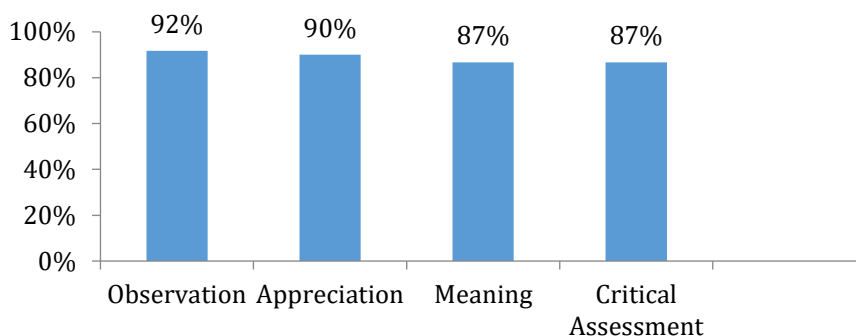


Figure 4. Recapitulation of student response results of the interactive e-book on creative dance content

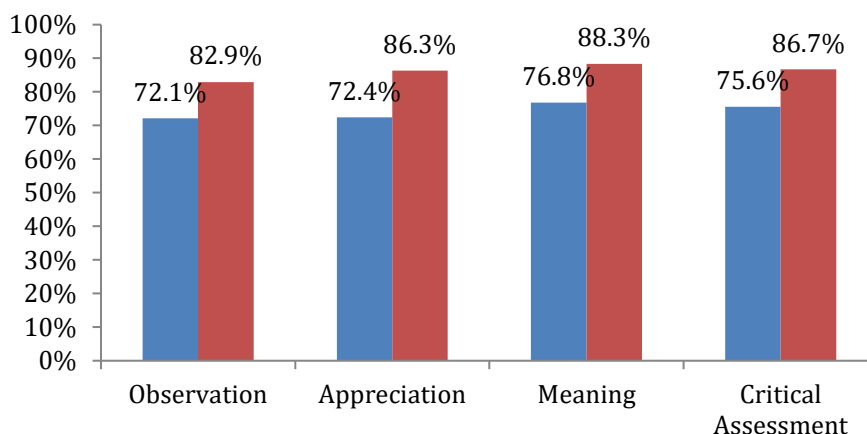


Figure 5. Recapitulation of pre-test and post-test results of students on the interactive e-book material of creative dance

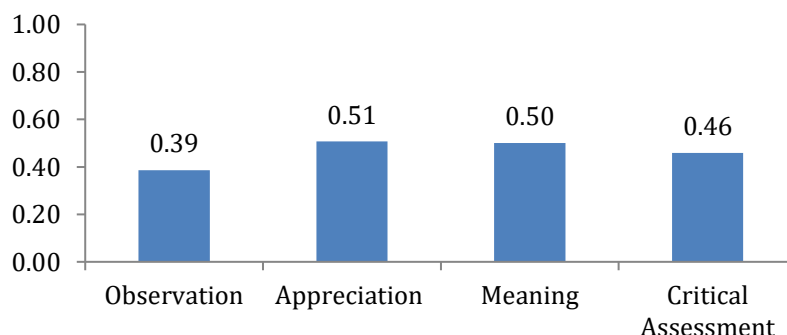


Figure 6. Recapitulation of N gain scores in the interactive e-book on creative dance material.

DISCUSSION

Interactive e-book material of creative dance art

The development of the interactive e-book on creative dance materials systematically integrated components of art learning, from basic information presentation to learning evaluation. The e-book is arranged in a detailed layout, from the introductory page to the evaluation question exercises. The use of this flow aligns with the principles of designing digital

learning media that prioritise a logical flow, content integration, and diverse learning modalities (Widyawati et al., 2022). This result indicates that the creative dance materials e-book positively contributes to enhancing junior high school students' appreciation of the arts through the systematic, multimodal, and interactive presentation of materials.

A clear table of contents and usage instructions in an interactive e-book are crucial for maximising usability and user experience. The research by Wang & Huang (2015) on mobile-based e-book interface design emphasises that aspects such as visibility, ease, efficiency, and aesthetics play vital roles in user perception and behavior when interacting with the e-book interface. The presence of well-designed and structured navigation, such as an easily accessible table of contents and consistent interactive icons or buttons in accordance with those principles, supports ease of orientation and minimises cognitive load, allowing users to focus more on the content and making the reading experience more comfortable, enjoyable, and effective (Wang & Huang, 2015).

The concept map at the beginning of the material helps students understand the framework of thinking before delving into detailed learning materials. The combination of text, illustrations, and dance videos helps students develop visual literacy, making them more critical in observing movement, expression, costumes, and rhythm of the dance. Visual literacy involves the ability to interpret, understand, and create meaning from visual representations (Farrar et al., 2024). The appearance of the concept map also provides an advanced organiser and memorising that can help students build cognitive schemas and remember information more easily through visual imagery (Jasti & Sidabutar, 2024).

The presentation of creative dance materials through text descriptions, visual illustrations, and learning videos can activate two cognitive processing pathways (verbal and visual) simultaneously. The Cognitive Theory of Multimedia Learning Mayer (2009) states that the learning process is more effective when information is presented through a combination of complementary text and visuals. Thus, students not only memorise movements but also understand the concepts of dance, the symbolic meanings, and the artistic values contained within. This supports the research by Day et al (2024), which states that interactive e-books with flexible navigation encourage self-paced learning and enhance deep conceptual understanding as the learning process adapts to students' needs.

The QR Codes in the e-books enable the integration of digital content without burdening the main file size. Students can scan the QR Code to access dance learning videos directly, zoom in on the details of movements, or replay specific parts. This method supports the research by Widyawati (2021), which suggests that interactive media with external links enhances student engagement and facilitates learning at their own pace.

The display of evaluation exercise questions after learning in the interactive e-book plays a crucial role as a formative assessment tool to measure the level of mastery of the material independently, while also obtaining instant feedback. This practice not only helps identify conceptual errors but also encourages active engagement through a variety of question formats, including multiple-choice and short answer, that accommodate different learning styles such as visual, verbal, and kinesthetic. Quiz-based or interactive question evaluations have been proven to enhance knowledge retention and encourage students to internalise the concepts learned (Day et al., 2024). Thus, the presence of evaluation exercise questions in the interactive e-book not only serves as a measurement tool for learning outcomes but also as an adaptive and motivating learning strategy for the future.

Results of validation and effectiveness of interactive e-book

Based on Table 4, the validation of the overall aspect scores 3.42, interpreted as very valid. In terms of the feasibility of presenting the interactive e-book on creative dance materials, its average score was 3.48, categorised as "very valid," which means this e-book has a high quality in terms of operation, visuals, layout, images, and video quality. Presentation feasibility is a key factor in the success of digital learning media, as an attractive appearance, easy navigation, and optimal multimedia integration can enhance motivation and deeper understanding among learners. According to Alqahtani & Rajkhan (2020), learning media with high presentation feasibility can facilitate more effective interaction between users and content, thus supporting the

achievement of better learning outcomes. In addition, research by [Chen & Wu \(2015\)](#) indicates that visual quality and layout arrangement in e-books have a direct impact on the concentration and memory retention of learners. Therefore, achieving a score of 'very valid' in the feasibility of presenting this interactive e-book emphasises that the media is not only suitable for use but also has a strong potential to enhance the effectiveness of learning creative dance through immersive and enjoyable learning experiences.

Based on the validation results in the content feasibility table, the interactive e-book for dance creation materials' average score was 3.44, which falls under the "very valid" category. This score indicates that the content of the e-book aligns with the developed concepts relevant to the junior high school curriculum, which determines learning outcomes, and supports the enhancement of students' appreciation for dance art. Content feasibility is a crucial aspect as it determines to what extent the presented material can meet learning needs and achieve the expected goals. According to [Elfiranur & Hariyani \(2025\)](#), aligning materials with the curriculum and learning objectives will ensure the meaningfulness of learning, facilitate teachers in integrating media into the learning process, and enhance student motivation. In this context, the preparation of creative dance materials consistent with the basic competencies and learning outcomes based on the D-phase elements makes this interactive e-book not only valid in content but also suitable as an innovative learning medium that can enrich students' learning experiences and support meaningful learning.

The linguistic feasibility aspect of the interactive e-book on creative dance materials has an average score of 3.34, falling under the category of 'very valid.' This indicates that the choice of sentences, systematic presentation, use of terminology, also the quality of content identity and information sources meet high academic standards for junior high school learning media. This is very important because precise and consistent language helps build trust, reduce the risk of misconceptions, and facilitate student understanding. In the context of learning media, evaluation of the language used in the materials is crucial. Research by [Yatri et al \(2024\)](#) on multimodal learning materials underlined that linguistic validation conducted by language experts involves revisions to sentence structures, word choices appropriate to the developmental level of students, and consistency in terminology significantly enhances readability, clarity, and student engagement. Thus, achieving a high score in this linguistic feasibility reinforces that the interactive e-book is not only technically valid but also linguistically, thereby optimally supporting instructional functions. Therefore, teachers can utilise this e-book in face-to-face, online, or blended learning. Schools can use it as a model to develop interactive media in other cultural arts subjects.

The limited test on 30 students showed that the interactive e-book is effective in supporting the appreciation of dance arts learning through four main aspects. First, the observation aspect at 92% reflects the students' ability to pay attention to visual elements such as appearance, images, layout, and navigation features of the e-book, which aligns with findings that visual literacy is crucial for enhancing understanding of interactive visual content ([Farrar et al., 2024](#)). Secondly, the appreciation aspect at 90% describes the level of emotional engagement, comfort, and enthusiasm of students through interactive quizzes. This is consistent with research by [Praheto et al \(2025\)](#), which indicates that the use of interactive multimedia significantly boosts motivation and engagement among students. Third, the meaning aspect of 87% indicates that students are able to connect the creation of dance materials with their prior knowledge, supporting the theory that interactive e-books based on visual literacy can deepen textual understanding, enhance visual comprehension, and increase student motivation and learning outcomes ([Yonanda et al., 2024](#)). Finally, the critical assessment aspect of 87% indicates that students can reflectively assess the creation of dance materials and conclude facts through the e-book, which aligns with [Suparno \(2018\)](#)'s findings that interactive multimedia effectively improves students' critical thinking skills through interactive media in the context of learning. Overall, this result confirms that interactive e-books are capable of simultaneously developing cognitive aspects, rational analysis, and critical thinking in the appreciation of dance arts.

Learning media is considered effective if it has a significant impact on learning achievement, whether in the 'effective' or 'very effective' categories. Learning media can be applied in teaching

and learning activities because it is capable of improving students' learning outcomes (Rahmawati et al., 2021). The results in Figure 5 show an increase in post-test scores of the four measured aspects, namely observation, appreciation, meaning, and assessment. The highest increase occurred in the appreciation aspect, with a pre-test percentage of 72.4% and a post-test score reaching 86.3%, resulting in an increase of 13.9%. In this case, it proves that students have the skills to appreciate the dance art they observe. This ability also supports advanced aspects, namely interpretation and critical assessment. The development of e-books supports students' ability to appreciate, which is vital to possess, so their art appreciation skills can improve. In dance appreciation activities, students are required to appreciate and pay attention to the rhythm, which is a crucial element in a dance (Abubakar et al., 2025). Other aspects, such as interpretation and critical reasoning, will also come into play when students can observe and appreciate properly. The four aspects show an increase in post-test scores, indicating that the development of interactive e-book learning media is effective in enhancing students' art appreciation skills.

The effectiveness of learning media in improving learning outcomes is measured through the n-gain test based on pretest and posttest scores that have been conducted. The pretest and posttest assessments in Figure 6 show that the development of an e-book on dance art insights can enhance students' art appreciation, indicated by the average n-gain score of 0.46, which falls under the medium category. Learning media is considered effective if the Gain Score obtained is > 0.3 or at least in the medium category (Dewi et al., 2022).

This study also provides paramount practical and theoretical contributions. Practically, it demonstrates that interactive e-books can serve as an effective, engaging, and motivating learning medium in the appreciative learning of dance, making it relevant for educators and instructional material developers to use in enhancing the quality of student interaction and understanding. Theoretically, this study strengthens the appreciative framework in dance by providing empirical evidence that aspects of visual processing (observation), appreciation, as well as interpretation and critical evaluation can be optimised through digital media. However, this study is still limited to a small sample and content, focused on a single type of dance, as well as interactivity that lacks AI-based personalisation. In the future, interactive e-books could serve as an initial step for developing learning media that incorporate artificial intelligence and are capable of providing real-time feedback through analysis of students' dance movements, as findings suggest that the combination of mobile learning, AI, and timely feedback has been proven to enhance performance, skills, and affective aspects compared to conventional media (Xu & Li, 2024).

CONCLUSION

The interactive e-book on creative dance material that has been developed meets the eligibility criteria as an innovative learning media at the junior high school level to enhance students' appreciation of the arts. The e-book is systematically organised, including a cover, introductory page, preface, table of contents, usage instructions, concept map, learning objectives, teaching material, evaluation, bibliography, and glossary. The overall average score was 3.42, interpreted as 'very valid'. Specifically, the presentation, content, and linguistic eligibility scored 3.48, 3.44, and 3.34, respectively. The results show that the e-book has aligned with the curriculum, facilitates teachers, and supports the enhancement of students' appreciation for the arts. The interactive e-book also encourages students to become more independent and increases their interest, motivation, reading enthusiasm, and learning outcomes. The interactive e-books have been proven effective in supporting appreciative learning of dance art by developing students' observation, appreciation, interpretation, and critical assessment skills through student responses, with an average score of 89%. The effectiveness of the interactive e-books in enhancing art appreciation reached an average percentage increase of 11.8% with a normalised n-gain score of 0.46, categorised as moderate. This study contributes by providing empirical evidence that multimedia-based interactive e-books can strengthen art appreciation while simultaneously developing students' cognitive, affective, and psychomotor aspects. The limitations of the study lie in the testing confined to a small group, making an inoptimal generalisation of the results. Therefore, further research is recommended to test the effectiveness of e-books on a larger scale, integrate interactive features based on the latest technology, and incorporate artificial intelligence

(AI) technology capable of providing real-time feedback through analysis of students' dance movements, to maximise the appeal and learning impact.

Author contributions

The authors made significant contributions to the study's conception and design. The authors were in charge of data analysis, interpretation, and discussion of results. The final manuscript was read and approved by the authors.

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Conflict of interest

The author declares that there is no potential conflict of interest.

Data availability statement

All data are available from the author.

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