The Development of Flipbook-Based E-Comics as a Learning Medium for the Entrepreneurship Subject among Ninth-Grade Vocational High School Students

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Abstract
The primary issue addressed in this research is the low level of understanding among Eleventh grade vocational high school students regarding entrepreneurship subjects, which are often perceived as unengaging. To address this problem, the study aims to develop interactive flipbook-based e-comics as learning media to enhance students' comprehension of entrepreneurial concepts. This research adopts the Research and Development (R&D) approach, specifically employing the ADDIE model, which consists of Analysis, Design, Development, Implementation, and Evaluation stages. Each phase of the model involves a systematic data collection process, including needs analysis, storyboard creation, and prototype development. The resulting e-comic is expected to serve as a practical and effective instructional tool, thereby supporting and enriching the entrepreneurship curriculum in vocational high schools.

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1. Introduction

The development of Information and Communication Technology (ICT) has had a significant impact on the education sector in Indonesia. One of the most noticeable changes is the way teaching and learning have become more interactive and engaging. The use of ICT in learning provides students with better access to learning resources and increases their participation in teaching activities. Several studies have shown that ICT enhances creativity in the learning process and makes it easier for students to understand the material being taught (Anggraeni, H., & Setiasih, 2023; Febriani, Azizah, Satria, & Putri, 2023; Mahmudah, Ni'maturahmah, & Dewi, 2023). The application of ICT-based learning media by teachers is expected to make the learning process more enjoyable and varied, which in turn will motivate students to be more actively involved (Febriani et al., 2023; Salim, Afdal, Deprizon, Aulia, & Wismanto, 2023).

Furthermore, ICT not only offers benefits in terms of access to information but also in integrating digital literacy into the educational curriculum. Educational programs that prioritize digital literacy are essential for preparing both teachers and students to adapt to the demands of an increasingly digital world (Paturrahman, Febrianti, Dongoran, & Sastrawati, 2024). For instance, the courses related to the development of digital literacy at Jambi University aim to prepare future teachers who are capable of integrating ICT into the classroom learning process (Paturrahman et al., 2024). Other research emphasizes that the integration of ICT in education also leads to the development of students' character and critical thinking skills (Sufyan & Ghofur, 2022; Sugiarto, Ambiyar, Wakhinuddin, Purwanto, & Saputra, 2023).

The integration of ICT in educational settings, especially through the use of e-comics, has been shown to enhance student motivation and engagement. For example, a study by Ambaryani and Airlanda (2017) found that using e-comics as a learning medium not only made the material more appealing but also helped students understand complex concepts through a more visual and simplified approach. Their findings revealed that students who used e-comics demonstrated greater engagement in the learning process, thereby improving their comprehension and retention of information.

The development of e-comics as instructional tools holds significant potential for enhancing the effectiveness of teaching and learning at the secondary school level. E-comics have been proven to convey information in an engaging way and to stimulate students' creativity during the learning process (Budiarto, Rahayu, & Fitria, 2023). Several other studies support this finding by demonstrating that e-comics can create a

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more interactive and enjoyable learning environment. Indriana, Umar, Nofrion, and Novio (2024) stated that the use of e-comics as learning media in the context of disaster mitigation can improve student learning outcomes better than reading conventional books. Furthermore, Afriana and Prastowo (2022) emphasized that the use of e-comics not only focuses on delivering content but also incorporates character values into each storyline, making the learning experience more relevant and engaging.

E-comics provide flexibility for students to access learning materials independently, which is very much in line with the characteristics of today's digital generation (Indriana et al., 2024). The availability of e-comics as learning media allows students to learn in a way that is more adapted to their own rhythm and learning style (Fianto, Indriani, & Aminas, 2023). Research by Sabri, Adiprabowo, Sumarlan, and Mohamad (2024) stated that comics are not only informative and entertaining, but also effective in improving literacy, especially in the context of health communication.

The use of e-comics in learning not only attracts students' attention but also opens up opportunities to improve their literacy skills. By combining text and images, e-comics encourage students to be more active in reading as well as understanding the context of the material presented (Suri, Astuti, Bhakti, & Sumarni, 2021). The use of comic-based media in learning has been shown to strengthen students' critical thinking skills, as they are required to analyze and evaluate information conveyed visually. In this context, Adnyani and Wibawa (2021) noted that digital comic media can support the online learning process and assist students in understanding the learning content better, potentially improving their analytical skills. The use of e-comics in the learning process gives students the opportunity to express their ideas and creativity, both in understanding the material and in creating new works (Indriana et al., 2024). This is particularly important in the current educational context, where literacy and creativity skills are becoming increasingly relevant (Dewi & Santoso, 2021). E-comics not only serve as an educational medium but also encourage students to innovate and develop their critical thinking. Consequently, incorporating e-comics into the educational curriculum may positively contribute to the development of students' literacy and creative thinking skills.

E-comics provide an engaging and interactive approach to learning. A growing body of literature has shown that comic-based media can enhance students' interest and motivation (Surya, Poerwanti, & Sriyanto, 2020). Flipbook-style e-comics allow students to interact with the content by flipping through pages and exploring the material in a dynamic visual format. This method is expected to help students concentrate more effectively and engage more deeply in entrepreneurial learning, thereby improving their understanding of the concepts being taught (Radeswandri, Vebrianto, & Thahir, 2021).

Entrepreneurship as a subject plays a vital role in equipping students with the knowledge and skills needed to navigate the modern labor market. However, many students struggle to grasp complex entrepreneurial concepts when taught through conventional methods (Sari, Arofatinajah, & Fajarianto, 2022). By utilizing e-comics in a flipbook format, instructional materials can be delivered in a more engaging and accessible manner, making it easier for students to internalize entrepreneurial principles (Habiddin, Ashar, Hamdan, & Nasir, 2022).

This study employs the ADDIE development model (Analysis, Design, Development, Implementation, Evaluation), which has been proven effective in the design and development of instructional media (Pulungan, 2023). Through the ADDIE model, the developed e-comics are expected to meet standards of validity, practicality, and effectiveness in learning. Additionally, the flipbook-style format allows the e-comics to be accessed via digital devices, offering students greater flexibility in their learning process (Liu, 2023).

The integration of digital technology into entrepreneurship education has been shown to improve students' readiness to face the challenges of an increasingly competitive global environment. Numerous studies have demonstrated that digital learning media significantly contribute to enhanced student learning outcomes (Hariandi, Oktaviani, Rahmadhani, Ningrum, & Ningrum, 2022). Therefore, the development of a flipbook-based e-comic learning media model is expected to support the improvement of entrepreneurship education in Indonesia.

E-comics also serve as effective pedagogical tools for fostering entrepreneurial spirit among students. Inspirational entrepreneurial stories presented in comic format encourage students to explore business ideas and develop their potential in the field of entrepreneurship (Gaol, Sibarani, & Husein, 2022). This objective is in line with the goals of entrepreneurship education, which emphasize both theoretical understanding and practical application (Pulungan, 2023).

The development of innovative learning media, such as e-comics, is essential for enhancing educational quality and ensuring that instructional content remains relevant to industry needs (Hermita, Alim, Putra, Gusti, Wijaya, & Pereira, 2021). The objective of this study is to develop a flipbook-style e-comic learning media model for use in eleventh grade entrepreneurship instruction. The study also seeks to evaluate the effectiveness of this model in improving students' comprehension and interest in entrepreneurship (Azman, Zaibon, & Shiratuddin, 2018).

In light of the aforementioned context, this research is expected to make a meaningful contribution to the creation of more engaging and effective instructional media, and to support the achievement of entrepreneurship education objectives in Indonesia (Habiddin et al., 2022). By developing flipbook-based e-comic learning media, it is hoped that students will acquire not only theoretical knowledge but also practical skills that can be applied in daily life and future careers (Wahyudi & Haryati, 2023).

This study also aims to provide new insights into how digital technology can be utilized in education, particularly in the context of entrepreneurship learning, to better prepare students for the demands of an increasingly competitive world (Muslim, 2018). Therefore, the development of flipbook-based e-comic learning media is expected to positively impact student engagement and understanding of entrepreneurship content.

2. Method

In this study, the use of the Research and Development (R&D) method refers to a series of processes aimed at developing new products or improving existing ones to ensure accountability. The resulting products are not limited to physical goods or hardware, such as books, modules, or instructional aids, but may also include software, such as computer programs for data processing in the context of classroom learning, laboratories, libraries, and various models of training, guidance, evaluation, management, and other systems (Haidir, 2019). In this case, the study focuses on developing effective flipbook-based e-comic media for entrepreneurship learning among eleventh-grade vocational high school students.

The development model used in this study is the ADDIE model, Analysis, Design, Development, Implementation, and Evaluation proposed by Robert Maribe Branch (as cited in Sugiyono, 2019). This model comprises five key stages: analysis, design, development, implementation, and evaluation. However, this research is limited to the development stage with the objective of producing e-comic learning media that is deemed valid based on assessments conducted by material and media experts.

The design and development of the entrepreneurial e-comic media follow the ADDIE model, which consists of five stages. **Analysis**: This stage involves identifying the needs of students and teachers in entrepreneurship learning, analyzing the characteristics of eleventh-grade vocational high school students, determining the necessity of e-comic-based learning media, and selecting content appropriate for entrepreneurship education. **Design**: At this stage, an e-comic storyboard is created, including storylines, characters, and scenarios that align with entrepreneurial material. This phase also involves planning the layout, selecting image types, and integrating text and interactive elements to ensure that the content is presented in an engaging and easy-to-understand manner. **Development**: Based on the storyboard and design, an e-comic prototype is created using graphic design software. Visual and interactive elements are added to enhance student interest and engagement. **Implementation**: A trial of the e-comic is conducted with a small group of eleventh-grade vocational high school students to observe their responses and assess their level of understanding of the material presented. **Evaluation**: Formative evaluation is conducted throughout the development process to identify areas for improvement. Summative evaluation is conducted after the trial to assess the overall effectiveness of the e-comic in facilitating entrepreneurship learning.

Data analysis from the validation tests conducted by content and media experts, along with teacher and student responses gathered through questionnaires, was carried out using qualitative descriptive techniques with percentage-based interpretation to determine the level of validity. This process involved recording the scores assigned by validators and calculating them using the following formula:

$$AP = \frac{Actual\ Score}{Ideal\ Score} \times 100\% \quad (1)$$

Information:
AP: Percentage Score
Actual Score: The score assigned by validators or experts
Ideal Score: The maximum possible score, obtained by multiplying the number of items by the highest score for each item

The resulting percentages are then categorized based on predefined scoring criteria, as presented in the following table.

Table 1. Media Feasibility Criteria, Content Feasibility, and Teacher Responses

No.	Percentage (%)	Criterion
1.	0 - 20%	Very Unfeasible
2.	21 - 40%	Not Feasible
3.	41 - 60%	Feasible Enough
4.	61 - 80%	Feasible
5.	81 - 100%	Very Feasible

3. Results and Discussion

The research and development conducted in this study resulted in a product in the form of an e-comic for Eleventh grade entrepreneurship material in vocational high schools. The development of the e-comic was carried out using the ADDIE model, which consists of five stages: Analysis, Design, Development, Implementation, and Evaluation. The development process followed several steps to produce the final product.

In the **Analysis** stage, the researcher identified students' needs in entrepreneurship learning, including the use of e-comic media and relevant content. The **Design** stage involved creating an e-comic storyboard, which included storylines, characters, scenarios, layouts, text, and interactive elements to present the material in an engaging way. In the **Development** stage, a prototype of the e-comic was created using graphic design software, based on the previously prepared storyboard, with the addition of visual and interactive components. The **Implementation** stage involved testing the e-comic on a small group of Eleventh grade students to observe their responses to the presented material. The **Evaluation** stage included evaluating the feasibility of the e-comic in terms of both media and content as a learning tool.

In the **Analysis** stage, the assessment focused on entrepreneurship material for Eleventh grade vocational high school students, adjusted to the theme "The First Step of Entrepreneurship."

In the **Design** stage, the first step was to determine the instructional content in accordance with the selected theme. The researcher chose the theme "The First Step of Entrepreneurship," which included materials such as Business Ideas, Capital Preparation, Creativity Messages, Market Surveys, First Production, Initial Sales, Evaluation, and Motivation to Continue Developing, with the primary focus on entrepreneurial aspects. The second step was to determine the applications to be used in the comic creation process. Selecting the appropriate tools plays an important role in determining the quality and efficiency of production. In this study, the researcher used Canva and the Heyzine website as the main tools.

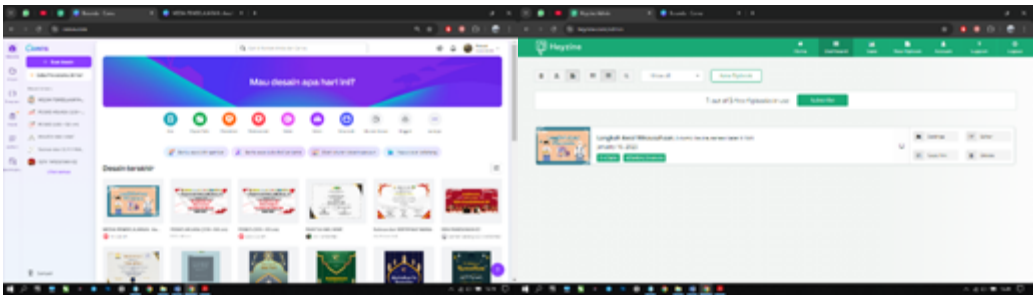

Figure 1. Canva and Heyzine Website

In the **Development** stage, the comic development process was carried out by implementing the pre-designed storyline and adapting it to the planned elements, with a focus on entrepreneurial content.

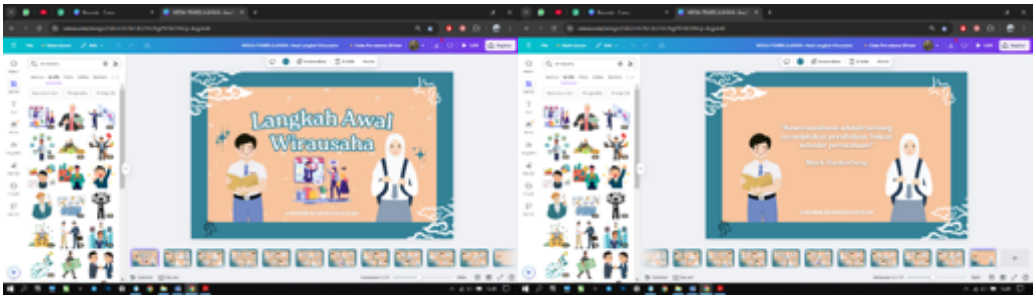

Figure 2. Creating E-Comics in Canva

The next stage was **Implementation**, during which the e-comic was tested on a small group of Eleventh grade vocational high school students. The aim of this trial was to observe students' responses and to measure their level of understanding of entrepreneurship materials, which included Business Ideas, Capital Preparation, Creativity Messages, Market Surveys, First Production, Initial Sales, Evaluation, and Motivation to Continue Growing.

The final stage was **Evaluation**, which included analyzing the results of both formative and summative evaluations based on data obtained during the implementation phase. Formative evaluation was conducted by

reviewing assessments from material experts, media experts, and teacher responses, and the feedback was used as a basis for product improvement. Meanwhile, summative evaluation aimed to assess the effectiveness of the product during the testing stage.

Figure 3. E-Comic "The First Step of Entrepreneurship"

Table 2. Validation Results from Content Experts, Media Experts, and Teacher Responses

No.	Role	Result	Category
1	Content Expert	86%	Very Feasible
2	Media Expert	90%	Very Feasible
3	Teacher Response	88%	Very Feasible

From the data presented in Table 2, it can be seen that the results of validation by content experts, media experts, and teacher responses were all in the "Very Feasible" category. The content expert gave a score of 86%, the media expert gave 90%, and the teacher response was 88%, with an overall average of 88%. These results align with the opinion of Hariadi (2019), who stated that a feasibility percentage in the range of 85%–100% can be interpreted as "very feasible."

The feasibility of using e-comics as a learning medium is also supported by positive student responses, who reported that the material was easier to understand. Additionally, the use of e-comic media made students feel more enthusiastic and engaged in the learning process. The feasibility of instructional media plays a vital role in determining the effectiveness of learning. Well-designed, engaging, and efficient media can accelerate the learning process and help students follow the material more easily.

Well-developed e-comics can cater to various learning styles, particularly visual and auditory learners, making the content more accessible and appealing (Purnamasari et al., 2018). Other studies have shown that attractive learning media can also enhance student character and learning independence, which is especially relevant in entrepreneurship education (Wibowo & Koeswanti, 2021). The use of e-comics helps students understand entrepreneurial concepts in a more interactive and enjoyable way. The development of e-comic learning media for Eleventh grade entrepreneurship is highly relevant to the digital generation, as it offers more engaging and interactive learning experiences preparing students to face future entrepreneurial challenges more effectively.

4. Conclusion

This study concludes that the development of flipbook-based e-comic learning media for entrepreneurship subjects in Eleventh grade vocational high schools is highly feasible and effective. Validation from material experts (86%), media experts (90%), and teacher responses (88%) confirms that the e-comic aligns with curriculum standards, features an engaging visual design, and supports students' understanding. With an overall feasibility score of 88%, the e-comic demonstrates strong potential for broader implementation in vocational education. Future improvements may include adding interactive features to further enhance student engagement and support long-term learning outcomes.

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