

Developing Life Skills with Digital Comic Books to Improve Students' Critical Thinking Abilities in Science Subject

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ABSTRACT

This research aims to develop a life skills-based science material digital comic book teaching material product based on life skills that is feasible, practical and effective to use. This research uses development research (R&D) with a 4D model (Define, Design, Development, and Disseminate) with research subjects of 24 class IV students at SDN 068006 Medan. Data collection techniques use observation, tests, questionnaires and documentation. The results of the research produced feasibility with an average percentage of 91% in the "Very Feasible" category, the practicality test percentage was 79% in the "Practical" category. Next, test effectiveness through student pretest and posttest scores with an N-Gain of 0.51 for the "Effective" criterion. So, it can be concluded that digital comic book teaching materials based on life skills can be used in the learning process.

KEYWORD

critical thinking; digital comic book; life skill

INTRODUCTION

The development of the era which continues to progress in industry 4.0 will have a good impact on human life, but this cannot be separated from the quality of human resources. The Indonesian nation has focused on the learning process being related to 21st century education where the aspects that are of concern are students' ability to think critically, creatively, collaboratively, and communication skills. The use of information technology increases the fulfillment of needs that are easily and quickly accessed by users. The belief that improving quality in education is a top priority is oriented towards more interesting learning. Based on the results of interviews with the class IV teacher at SDN 068006 Medan, it was found that teachers still use printed teaching materials in the teaching and learning process. Meanwhile, it is known that the learning process at the school has used the Independent Learning Curriculum which has switched to a subject-based approach, especially in class IV. Learning process activities require students to learn independently or in pairs and require teachers to act as facilitators who can facilitate students, one of which is providing various kinds of information through teaching materials.

However, in reality the provision of teaching materials only focuses on textbooks that have been provided by the school, the teaching materials provided are less varied and less interesting to support the learning process on natural and social science (IPAS) content. In line with research conducted by Jannah & Atmojo (2022), the use of teaching materials can support the smooth science and science learning process in elementary schools, especially in developing 4C abilities, one of which is critical thinking. Teachers can use the help of concrete objects; the use of concrete objects is not always easy to obtain. So, teacher

creativity is needed in managing and changing teaching materials appropriately and efficiently to achieve science learning objectives.

Apart from the problem of unattractive teaching materials, teachers also add several obstacles, namely: (1) the classroom atmosphere is crowded or not conducive; (2) during the learning process the teacher gives questions to students that are analytical in nature (C4), only 23% of the total number of students are able to provide answers indicating critical thinking, while other students answer with the same answers as in the textbook and some do not answer the question; and (3) during the evaluation, the teacher gave story questions at level C4 (analysis), but only 35% of students were able to answer correctly, and 65% of students still did not answer the evaluation questions correctly. Based on these problems, learning teaching materials are needed that are able to minimize the shortage of printed books and instill students' mastery of concepts. Teachers who are obliged to deliver learning materials are no longer the only source of knowledge, but instead take turns in the role of facilitators in using and developing learning teaching materials, one of which is digital comic book teaching materials.

Digital comics are also cheaper to make than printed comics. Several researchers have developed digital comics to be used as teaching materials. According to Triana & Tamba (2023) the selection of teaching materials by presenting stories and pictures can be done using digital comics which are easy for students to access anytime and anywhere so that students are able to understand the material independently and flexibly. Furthermore, a study conducted by Kibtiyah (2022) showed that the development of flipbook-based digital comics was very suitable for helping students understand material concepts in an effort to develop students' critical thinking skills. The use of comic teaching materials can improve student learning outcomes and provide meaningful learning experiences because of the effectiveness of the application of comics (Dessiane & Hardjono, 2020).

This research will also integrate life skills education into science lessons and package it in digital comic book teaching materials. According to Rulyansah, A (2020) life skills are practical skills that become a guide for students to find solutions to problems. Through other innovations by observing and applying the surrounding environment in everyday life. So it is important and appropriate when life skills are integrated into learning which is able to develop students' perspectives and thinking patterns, especially in today's 21st century learning. It is hoped that science subjects will develop student attitudes, namely high curiosity, analytical, critical thinking, objective, systematic, open, honest, responsible and able to make the right decisions (Fanani et al., 2022).

With fun learning, students can be motivated to understand a learning topic material independently and learning can be memorable and meaningful for students, especially in the science and science subject material on forces and motion of objects in class IV SDN 068006 Medan. Based on the background, the problems in this research are: (1) Is the digital comic book product in science and science learning using kvisoft flipbook based on life skills on style and movement material for class IV students at SD Negeri 068006 Medan which was developed valid by Material Experts, Language Experts, and Media Expert? (2) How is the practicality of digital comic books using kvisoft flipbooks based on life skills in learning science and technology on style and movement material for class IV students at SD Negeri 068006 Medan developed? (3) What is the effectiveness of digital comic books for learning science and technology on force and movement material using kvisoft flipbook in improving the critical thinking skills of fourth grade students at SD Negeri 068006 Medan?

RESEARCH METHODS

The type of research used is development research or Research and Development (R&D). The designed development research is focused on digital comic book products that are integrated with life skills education to improve students' critical thinking abilities. To obtain a development prototype, an adaptation of the 4D model proposed by Thiagarajan (1974) was carried out with stages, namely: (1) The Define Stage aims to determine and define learning requirements. Activities carried out in the definition stage include initial-finish analysis, student analysis, needs analysis, concept analysis, and specification of learning objectives; (2) Design Stage: This stage designs the basic instruments for measuring product feasibility and measuring students' critical thinking abilities. This design stage consists of several steps, namely: preparing the instrument, selecting the format and initial design; (3) Development stage, this stage produces a draft product that has been revised based on input and data obtained from experts or validators, and (4) Disseminate stage after the trials and instruments have been revised, the next stage is the dissemination stage. This dissemination is important as an effort to provide a different learning experience and the benefits of the development carried out can be felt by students (Handayani, N. A., Nazaruddin, R. S., & Latip, A. E., 2023).

The method used in testing product suitability using a questionnaire or questionnaire is a way to obtain or collect data by providing a list of statements or questions to respondents or validators regarding the aspects you want to measure (Waisakanitri et al., 2023). This research used five validators consisting of lecturers who are experts in their fields. The validation sheet that will be used uses a 1-5 Likert scale with a checklist formation. Sugiyono (2022) stated that the Likert scale is used to measure a person's opinion or perception, in this case the opinion regarding the quality of the teaching materials used. The questionnaire used in data collection will be given to material, design and language experts. This digital comic teaching material development product can be said to be very valid if it obtains a percentage result in the value range of 80-100 and can be used with a minimum percentage result in the value range of 40-60 in the quite valid category. Research conducted (Handayani, T., 2021) suggests that practicality is a requirement for a standard in development research. The practicality of digital comic book teaching materials can be seen from the results of the teacher and student practicality questionnaire identification. The effectiveness of using digital comic book teaching materials based on life skills to improve students' critical thinking abilities is obtained from student learning outcomes. Data on learning outcomes of fourth grade elementary school students were carried out in research trials. This result data consists of pre-test data (before using teaching materials) and post-test data (after using teaching materials). Digital comic book teaching materials are said to be effective if students' learning outcomes increase during the post-test. To determine the increase in pre-test and post-test learning outcomes, it can be calculated using the N-Gain formula analysis (Maghfiroh & Gunansyah, 2021).

RESULTS AND DISCUSSION

This research is development research carried out at SD Negeri 068006 Medan which is in Simalingkar Medan. The results of this research are in the form of digital science comic book teaching materials based on life skills. Products developed using kvisoft flipbook. Digital comic books are combined with text, images and video as an application that supports teaching materials in the learning process because this application is not only focused on images but can include motion animation, video and audio which can be less monotonous. This research aims to determine the level of validity, practicality and effectiveness of the teaching materials developed in improving elementary school students' critical thinking

abilities. The development of this teaching material was carried out in accordance with development research procedures with a 4-D model developed by Thiagarajan, Semmel with the steps Define, Design, Development and Dissemination. Data analysis and research results obtained in each development stage are presented as follows.

Definition

The definition stage is the first step in making this teaching material to find sources of information in schools because with this, this teaching material will become a predetermined learning requirement. The initial-finish analysis stage of the learning process carried out so far aims to determine the basic problems needed in developing teaching materials. Based on the results of observations at SD Negeri 068006 Medan, there are still many weaknesses in the learning tools used by educators for teaching, especially in the textbook section, as a result, this indirectly contributes to students' low critical thinking abilities. In the analysis stage of the characteristics of elementary school students, the researcher carried out an analysis through interviews with the homeroom teacher, namely Mrs. Latipah Hannum Albadani Ritonga, S.Pd. The aim was to adapt the students' characteristics to the digital comic book teaching materials that would be designed. The results of the analysis of student characteristics obtained are that, in terms of their cognitive development, at their average age they are at the concrete operational stage, namely being able to use adequate logic.

At the concrete operational stage (7-12 years) they are able to classify objects, commands and complete them with children's imaginative thinking abilities and children themselves must actively build their own knowledge (Magdalena et al., 2023). The purpose of concept analysis is to define, detail and determine the concept of subject matter. The material used in this research is about social natural sciences (IPAS) class IV elementary school with reference to the independent curriculum. This concept map was then adapted to the life skills approach. The results of the concept map analysis obtained from the IPAS material refer to the independent curriculum. Then the stage of formulating learning activity objectives is a reference in designing digital comic book teaching materials based on life skills. Learning objectives are adjusted to the flow of learning objectives (ATP) of the independent curriculum. Learning achievements/learning objectives are adjusted to the ATP Independent Curriculum, formulation of learning activity objectives.

Design

Life skills-based digital comic book teaching materials were designed and developed for class IV Science in Force and Movement Material. The design stage aims to prepare guidelines for compiling the media as a whole. (1) The material design is focused on force and motion with several sub-chapters, namely, the influence of force on objects, the magnetism of a magical object, elastic objects, and why we don't float in the air, through the flow of learning objectives, learning outcomes and teacher's books as well as other sources. (2) The formulation of story ideas will refer to the form of the story that will be expressed in the comic. In this story line there are several components, namely: setting, names of characters, descriptions of conversations and what part of the lesson. (3) Designing the product design includes determining the size of paper to be used, determining elements and templates that are suitable for use according to the theme, carrying out the coloring stage, giving color to the elements, and giving text to the image. (4) Planning product validation instruments, namely a questionnaire will be used.

Development

In the third stage of this research, digital comic books will be developed with various characters made attractive and also adding animation. The storyline is structured by including live character education and integrating style and movement material in it.



Figure 1. Front and Back Views of a Digital Comic Book

The image above is the front and back view of digital comic book teaching materials. The back display is given a barcode to make it easier for students to study at home or anywhere. In the digital comic book, there are instructions to direct students in its use. Students can use this digital comic book by following every instruction given so that the storyline is not confusing so that the learning material can be understood by students. At the development stage, several aspects will be carried out, namely validity testing, practicality testing and effectiveness testing. The test in this case is only used to determine students' cognitive improvement in terms of knowledge. Development stages are as follows:

Digital Comic Book Validity Test



Before digital comic books based on life skills are used as teaching materials in learning, these digital comic books must go through a validation process until they are truly declared appropriate and valid. Every aspect of the assessment is validated by people who are experts in their field. Validation activities focused on improving the life skills-based digital comic book draft previously created by the researcher. The feasibility results for digital comic books are determined based on the results of a review by experts including subject matter experts, design experts and language experts. The results of the feasibility test can be seen in Table 1.

Table 1. Product Feasibility Test Results

No.	Test Subjects	Feasibility Test Results	Category
1	Materials Expert	92%	Very Good
2	Design Expert	90%	Very Good
3	Linguist	92%	Very Good



Based on the results of the product feasibility test, it can be concluded that digital comic book teaching materials have an assessment in the very good category so they are suitable for use in learning. The results of the product feasibility test based on reviews from experts obtained criticism and suggestions which were used as material for improvement in perfecting the digital comic book products being developed. Criticism and suggestions obtained from material experts as well as improvements that have been made can be seen in Table 2.

Table 2. Material Expert Improvements related to Products

Suggestion	Before Revision	After Revision
<p>The truth of the concept statement needs to be considered in the matter of frictional forces. As given, a description of the conditions that lead to the roughness of the two surfaces of objects in contact.</p>		


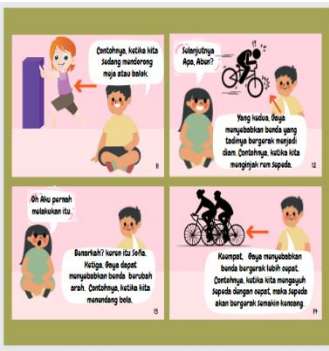
Criticism and suggestions obtained from material experts have been revised according to the criticism and suggestions to perfect the digital comic book teaching material product being developed. The criticism and suggestions given from design experts as well as improvements that have been made can be seen in Table 3.

Table 3. Design Expert Improvements related to Products

Suggestion	Before Revision	After Revision
<p>The theme on the cover must be engaging and describe the overall material in the book. And the names of the authors are placed on the left side so as not to make things difficult for readers. Then a special sheet is given to identify the book.</p>		

Comments and suggestions obtained from design experts have been followed up and improved according to criticism and suggestions to perfect the digital comic book teaching material product being developed. The comments and suggestions given from language experts as well as improvements that have been made can be seen in Table 4.

Table 4. Linguist Improvements related to Products

Suggestion	Before Revision	After Revision
Pay attention to the punctuation in every conversation. Like a comma, a question mark. And unnecessary sentences are deleted.		

Digital Comic Book Practicality Test

To find out the practicality of the digital comic book teaching material product being developed, it can be seen from the response to use by students and teachers. The practicality of the product at least gets the "interesting" category from the average score of student responses. This student response data was created with the aim of knowing the extent of interest, feelings of enjoyment, up-to-dateness, and ease of understanding the components of the life skills-based digital book teaching materials being developed. The results of the student response questionnaire filled out by 24 students after taking part in learning with life skills-based digital comic books can be seen in Table 5 below:

Table 5. Data from Recapitulation Results of Student Response Questionnaires

No	Students	Percentage	Criteria
1.	19	79%	Interested
2.	5	21%	Less Interested

Based on the practicality recapitulation data obtained, it is known that the average percentage of practicality of digital comic book teaching materials based on life skills as a whole is of interest to 19 students with a percentage of 79%. So it can be stated that from students' responses to the digital comic book teaching materials based on life skills that were developed practically. Meanwhile, the results of teacher responses were obtained based on questionnaire assessments that were given to teachers during the trial. The purpose of collecting this data is to determine the practicality of the product that has been developed. It is known that from the 15 questions asked, the teacher responded by giving the highest score for each question item. So from the teacher's response assessment it is known that the calculation obtained is 100%, which means that the product that has been developed is very practical and without revision because there are no revision suggestions from the teacher.

Test the Effectiveness of Digital Comic Books

After the learning is complete, students are given questions on critical thinking skills in Science and Technology. The post-test questions given are 10 essay questions. The questions given are identical to the pretest questions to see whether there is improvement or improvement after students use the life skills-based digital comic book. The effectiveness results obtained through the pretest and posttest can be said to be effective by increasing student learning outcomes. The test results show that the average pretest score for fourth

grade elementary school students is 57.5, while the average posttest score for fourth grade elementary school students is 79.2. There was an increase in scores after the learning process activities using digital comic book teaching materials based on life skills amounted to 21.7. Gain testing aims to see an increase in critical thinking skills after using the development of digital comic textbooks. The results of the calculations obtained that the N-Gain output data from the pre-test and post-test results of students' critical thinking abilities who used the development of digital comic textbooks was 0.51. Based on a comparison of the average post-test and pre-test scores above the N-Gain formula, it is 0.51 which is included in the range $0.30 \leq g \leq 0.70$ with the "Effective" criteria. So, it can be stated that digital comic book teaching materials based on life skills are effectively used in the learning process.

Disseminate

The dissemination stage is the final stage in the 4-D development model. At this stage, the learning tools that have been tested in the research class will be tested again by comparing the learning tools that have been developed with the tools usually used by class teachers at SD Negeri 068006 Medan. This research is development research (Research and Development) so that the product of the research is a product that meets the criteria for being feasible and effective.

Based on the results of data analysis on the development of teaching materials for digital comic book products for fourth grade students at SD 068006 Medan, through observations, it can be seen that students do not really pay attention to the lessons, this indicates that the teaching materials used by teachers are less interesting and the student learning outcomes include the integration of life skills into the material. style and movement before the development of digital comic books, students were less analytical, as evidenced by the percentage obtained, namely 77% of students who were not able to think critically in answering questions. This finding is strengthened by previous research which states digital comics as learning teaching materials to improve the life skills abilities of early childhood (Indriasih et al., 2020). Digital comics are suitable for application in science learning (Jannah & Atmojo, 2022). Style and movement material is easy to understand by applying digital comic teaching materials based on the environment and everyday life. Digital comics in science learning as character formation for students in the future (Putri, D. A. Y., & Istianah, F., 2021). In line with previous research conducted by NG et al., (2022), the development of digital comic teaching materials in their use is very beneficial for learning in the current era, where the presentation is able to attract students' attention in learning, improve students' critical thinking skills, and can be used in online learning or offline so that learning becomes meaningful when it is adapted to the characteristics of student development (Kibtiyah, 2022); (Fironika, K., R., Ulia, N., & Sari, Y, 2020); (Asrizal et al., 2018).

The results of the validity or feasibility test of digital comic books that have been carried out show that the digital comic books developed are in the very good category. In line with research by Fanani et al., (2022) stated that product validation activities are able to provide input so that valid and reliable products can be produced. The criticism and suggestions given are used as material for initial revisions, until the product is ready to be tested. The results of the review are seen from the instrument which consists of several aspects and assessment indicator items. Several important aspects that lead to obtaining excellent qualifications, namely the material expert aspect, include suitability of material to the curriculum, accuracy of material, suitability of material to student characteristics, and material in language that is easy to understand. The expert aspects of design include product appearance that can attract students' attention, product content, and product completeness. The grammatical aspect includes the appropriate and consistent use of language as well as

appropriateness for student development. Conformities between learning objectives adjusted to the flow of learning objectives (ATP) contained in the teaching module and conformity with the KBBI have a significant influence on the clarity of the material presented in digital comic books (Pinatih, S. A. C., & Putra, D. K. N. S., 2021). Digital comic book teaching materials are visual image media in which a straightforward and coherent story is presented, making it easy for children to understand the content of the stories in digital comic books. Digital comic books have advantages including: interactive, interesting, easy to access, long-lasting and cost-effective. Digital comic books can be used for two-way learning activities, either as teaching materials in class or as a tool that can be used in independent learning for students (N. A. Handayani et al., 2023); (Senjaya, P. et al., 2022). In line with previous research, Triana & Tamba (2023) also added that this digital comic book can attract students' attention because the learning process uses in focus and is connected to the internet. There are clearly visible differences in students' activity and attention when using various learning teaching materials in the learning process.

Practicality data can be obtained from filling out response questionnaires by students and teachers when product trials are carried out. Based on the results of filling out the response questionnaire by students, it can be seen that students can easily understand the style and movement material in the digital comic books used. This statement is in accordance with the percentage of students who are interested in using digital comic books, namely 79%. The results of filling in the teacher response questionnaire can also be seen if providing digital comic book teaching materials to class IV students can increase motivation to learn about force and movement material. This statement corresponds to a score of 100% and is declared "Very Practical". This is supported by research by Wahyuni et al., (2021), the practicality of the product being developed shows that it specifically makes it easier to use and has an appeal. It is clear that there are differences in students' activeness and attention using various learning teaching materials in the learning process. Telaumbanua, S. A. S., & Hutahaeon, J. (2021) in their research also stated that a positive response to the use of electronic teaching materials can stimulate students' enthusiasm for learning. This statement can be proven through the results of filling out response questionnaires by students and teachers. From filling in the response questionnaire, digital comic book teaching materials were considered practical because they had interesting images or visuals based on story characters and interesting plots. The presentation of attractive images combined with the use of simple language makes it easier for students to understand and determine existing concepts (Jannah & Atmojo, 2022). The pictures presented by students will be more interesting and will be able to attract students' attention so that students will find it easier to understand the lesson material (Nasrullah, Y., Akbar, Z., & Supena, A., 2021). Research by Riwanto & Wulandari, (2018) shows that comics are parallel images in a deliberate sequence, intended to convey information. The information in this research is subject matter. The advantages of comics can make it easier for students to grasp abstract things or formulas and develop children's interest in reading.

In testing the effectiveness of the results of developing digital comic book teaching materials based on life skills in the learning process between teachers and students. The teaching materials developed must be interesting so that they can encourage students to improve their critical thinking skills. The development of teaching materials can support achieving national education goals. One of the goals of education is life skills education, which is able to develop students' learning abilities, understand their own abilities/talents so they can be developed and applied to everyday life, and solve life problems creatively (Rulyansah, 2018). According to Huda (2022), the level of effectiveness of a teaching material can be determined by providing a pre-test and post-test. The pretest is used to

measure students' initial level of understanding before teaching materials are applied in the learning process, while the posttest is after they are applied. The results of students' learning completion show that students' initial abilities obtained an average score of 57.5 and posttest results obtained an average score of 79.2. The data obtained from the pretest and posttest were then analyzed using SPSS. The analysis carried out included the normality test, N-Gain test, and students' level of understanding of concepts.

In the normality test analysis, the posttest data shows a P-value = (sig) $0.147 > \alpha = 0.05$, which means that H_0 is accepted, so the data is normally distributed. Meanwhile, the results of the posttest data show a P-value (sig) = $0.185 > \alpha = 0.05$, which means that H_0 is accepted, so the data is normally distributed. Based on the pretest and posttest data in the research, it was normally distributed. Then, based on the N-gain value, the average N-gain value was 0.51 and entered the medium category. This means that these results identify that the level of effectiveness of digital comic book teaching materials is in the medium category or can be said to be quite effective in improving students' critical thinking skills.

CONCLUSION

The conclusion of this research has been the development of digital comic book teaching materials based on life skills in the science and science subject material on style and movement for grade IV elementary school which was assessed by a team of expert validators totaling 3 people. The validation results show that the digital comic book, seen from the material expert's assessment, shows a percentage of 92%, the design expert's assessment shows a percentage of 90%, and the language expert's assessment shows a percentage of 92% with very valid criteria from the three validators. The practicality assessed from the results of the analysis of student and teacher response questionnaires shows that digital comic books in grade IV elementary school science and science subjects obtained very practical results, so digital comic book teaching materials can make learning easier for students. The effectiveness assessed from the students' post-test and pre-test results shows that the N-Gain value has increased, namely 0.51 with effective criteria. So using digital comic book teaching materials based on life skills can improve students' critical thinking abilities.

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