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The Development of Digital Comic Media for Science Subject to Improve Information Technology Literacy Skill for Grade IV Elementary School Students

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Abstract

The aim of this study is to determine the effect of implementing the results of digital comic development in improving the information technology literacy skill of fourth grade elementary school students. This study used RnD method with the ADDIE model (Analysis, Design, Development, Implementation and Evaluation). The research subject was fourth grade students at Kuranji State Elementary School, Cirebon City. Furthermore, the data collection technique was the media expert, linguist, material expert validation questionnaire, test techniques and student responses. Aiken's validity results show the lowest index results from media experts, language experts and material experts of 0.67 and the highest index is 1. Furthermore, the results show that the student test instrument variables are declared reliable based on Cronbach's Alpha reliability calculations that is 0.937 with very high criteria. The Pearson Product Moment correlation coefficient value between the implementation of digital comic development results and students' information technology literacy skills is 0.693. Digital comics affect students' technological literacy skills 48.0%. Moreover, the average percentage of student responses to the implementation of digital comic development in energy sources science learning materials for class IV elementary schools is 94.4% with very high criteria. Digital comic media is feasible, and it has a significant effect on increasing the information technology literacy skills of fourth grade elementary school students.

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INTRODUCTION

Education in the digital era requires innovation and creativity in using learning media. Technology is becoming increasingly important and it triggers students' motivation so that they have learning skills and can innovate (Muhasim, 2017). Digital technology for learning has a positive effect in increasing the intention to learn (Jang et al., 2021). Furthermore, advances in science and technology learning media should now be easily accessible to students through digital media (Pinatih & Putra, 2021). Digital media is any media which is coded into a format that can be read by a machine. It is a combination of stored data, text, sound and images in digital format (Putra et al., 2022). It can be created, viewed, distributed, modified and maintained on digital electronic devices. The development of digital media and its broad influence on society leads to the beginning of a new era of a paperless society, where all of media are produced and consumed on computers.

Comic media is suitable for elementary school students since elementary school students have a high interest in visual images (Daulay, 2017). Comic media is made sequentially, requiring memory and imagination by oneself (Subroto et al., 2020). Comic media, namely printed picture books with attractive colors and illustrations of characters, words/sentences arranged in word balloons in order to convey information to readers (Khasanah et al., 2021). Historically, Indonesian comics are believed to have appeared since the existence of reliefs on temples on the island of Java. Comics are a narrative told through images arranged in horizontal lines, strips, or boxes, called panels, and it is read like verbal text from left to right (Patricia, 2018).

Digital comic learning media can be accessed digitally either through smartphone or computer. The learning media which can be used in comics is called (media-education), comics can be used as an effective and educative learning media (Ratnasari & Ginanjar, 2020). Moreover, the use of educational comic material is predicted to help educators; especially, during a pandemic in distance learning (İlhan et al., 2021)ilhan. The use of digital comic media has a strong effect on the development of students' digital literacy since it can increase knowledge and experience of reading and analyzing (Kirchoff, 2017). The use of comics in educational spaces has been documented in supporting literacy practices (Dallacqua, 2020). In addition, digital comic media can improve students' scientific literacy (Handayani, 2021) besides, suitable media for elementary school students is comic media (Astutik et al., 2021).

21st Century skills include information, media and technology skills including information technology literacy (van Laar et al., 2020). Teachers should build children's literacy skills, both old literacy (reading, writing, arithmetic), and new literacy (data literacy, technology and humanism) as well as financial literacy (Muliastrini, 2019). This technological literacy ability is important for everyone to master, not only teachers but also students (Amri et al., 2021). Moreover, information and communication technology literacy is the ability to use ICT in order to find, assess, use, create and communicate information which in its implementationh these abilities require cognitive and technical skills (Yazon et al., 2019). In other words, ICT literacy consists of computer literacy and information literacy (Andi et al., 2020).

The new concept of literacy includes technological literacy or the ability to utilize new media; such as, computers and internet to access and communicate information effectively (Helaludin, 2019). Students' low technological literacy can be improved by using technology in learning, including the use of digital comic learning media (Ketut et al., 2022). The use of ICT-based media aims to make students discover some of the concepts of subject matter which were previously unknown to students. Increasing information technology literacy by using teaching materials which are packaged in the form of interactive digital comic results that prove to be effective, learning using information technology literacy can increase the intensity of student involvement (Khotimah & Hidayat,

2022). In addition, the use of interactive digital comic media can increase students' interest and motivation in learning. Digital comic media can increase student interest in learning, the result is that learning material packaged in digital comic media has distinct advantages from other media; such as, moving backgrounds and interesting characters which have never been encountered in previous media learning which can increase student interest in learning (Adnyani et al., 2021).

Comic media containing science is significantly effective in increasing motivation (Sari & Ratu, 2021). Furthermore, the application of visual learning media can build students' learning motivation, visual media containing images can make students interested in learning, understand the material provided better, and be active until the end of learning. Effective visual learning media is not just seen from the sophistication or luxury of the media created, but how the media can help achieve learning goals since it is created by using principles which suit students' characteristics (Hae et al., 2021)

In fact, it shows that information technology literacy has indeed been implemented at all levels of education, including elementary school. However, based on the results of observation data obtained, many students as the main subject are still not familiar in using digital learning media to learn. One of the subjects which is closely related to technology is the subject of Natural Sciences. In science subjects, we discuss aspects of science related to nature and the environment. In natural sciences, students will study various concepts and theories about natural phenomena; such as, physics, chemistry, biology and geology. By mastering these concepts, students can understand how technology can be used to explain and overcome various problems or challenges in the field of natural sciences. In science subjects, alternative energy source material has high potential to be used as a basis for improving the information technology literacy skills of fourth grade elementary school students since this concept is related to students' daily lives.

However, based on the results of observations and interviews with teachers and students, it shows that there is no use of digital comic media in conveying material on energy sources in science subjects. Through interviews with fourth grade teachers at the Kuranji State Elementary School, it shows that the delivery of material on alternative energy sources in science subjects often uses printed books, student worksheets, images or videos. In addition, at SDN Kuranji there is no learning media based on information technology, but there are lots of learning media in printed form such as theme books and worksheets.

Furthermore, the school received assistance in the form of Google Chromebooks from the Cirebon city government as a means of learning for students at school, but this assistance has not been utilized optimally. The development of digital comic media is an audio visual media which contains energy source materials and changes to improve information technology capabilities and student learning motivation. During learning, printed books and worksheets can create a passive learning atmosphere so that students feel bored and less interested in learning (Yuanta, 2019). Students' lack of interest in reading printed books because they have long reading descriptions (Asyhari & Silvia, 2016).

Based on observations of student learning outcomes at Kuranji State Elementary School and data from interviews with teachers, it shows that when students were asked to explain examples and use of alternative energy sources, they were still not quite right, some even did not understand at all. Therefore, it is important to present a learning media which allows students to be actively involved in learning activities so that the concepts obtained by students can be meaningful. In addition, students are not used to using technology since in learning teachers have not used digital learning media based on information technology so that students' information technology literacy at Kuranji State Elementary School is categorized low.

Students' low information technology literacy is caused by a lack of emphasis on critical thinking skills from an early age. Forms of digital media innovation in empowering 21st century critical thinking skills in natural science lessons in elementary schools include digital comics (Jannah & Atmojo, 2022). Furthermore, digital literacy needs to be honed since elementary education. Research related to learning using technology is also increasingly being published; such as, e-learning (Mosca et al., 2019), education in the era of the industrial revolution (Hussin, 2018), use of technology and learning characteristics (Lai & Hong, 2015), how to learn digital (Molnár, 2015), and e-books (Janah et al., 2022) but the use of e-book media is limited to only containing text and images. Based on previous research and development, in this study a new learning media is developed in the form of digital comics on energy source material. Learning media is designed based on the sequence of the scientific method.

The learning media design is named 'Energy Digital Comic'. In this media there are audio greetings from the teacher, comics, videos on energy sources and their changes, exercises, reflections on learning by describing feelings through emoticons, and media profiles. The advantage of developing digital comics is that students can learn through audio (sound), visual (images) and video (moving images) elements as well as learning exercises. This study is conducted to improve the information technology literacy skills of fourth grade elementary school students and students' responses to the development of 'Energy Digital Comics' media. This media applies the steps used in the scientific method and combines it with technological developments in order to improve students' information technology literacy skills while providing a complete understanding through providing a fun technology-based learning experience.

The 'Energy Digital Comic' media generally uses computer devices as a tool to conduct learning; besides, computers, students can also use mobile/smartphones which is supported by the internet. The learning concept itself has advantages that other media do not have, namely that it is easy to access at any time and it is more interesting to learn in general. Learning can be conducted anywhere and anytime; besides, it is conducted instantly and learning access is controlled personally.

The development of this digital comic is adapted to the characteristics of elementary school students so that it is attractive by using colorful pictures and cute comic story characters so that it is child friendly (Ulfa et al., 2022). Presentation of character images in comic media attracts students and clarity in writing comic media (Ferania & Wardani, 2022). Making comics should have a message that should be conveyed (Riwanto & Wulandari, 2018). In this ' Energy Digital Comic', the content of material regarding energy sources is the message which will be conveyed.

Comics were chosen since they are simple in presentation and they have story sequence elements which contain a large message, but they are presented concisely and easily understood and are equipped with dialogic verbal language. Furthermore, the development of digital comic media is based on constructivism theory. According to constructivist learning theory, knowledge cannot simply be transferred from teachers to students. Students should be mentally active in building their knowledge structure based on their cognitive maturity (Masgumelar & Mustafa, 2021). Learning based on constructivism theory will build students' critical thinking abilities. Constructivism is a learning theory which builds students' critical abilities in accordance with Bloom's taxonomy (Jitka et al., 2018).

The aims of this study are that to determine the level of feasibility of the results of the development of digital comics in science learning content, to determine the effect of the implementation of the results of the development of digital comics in improving information technology literacy skills and the response to the implementation of the results of the development of digital comics for fourth grade elementary school students. In addition, digital comic learning media can be used as a

science learning media regards to energy sources and their changes.

METHOD

Research Design and Procedures

This study was conducted by using Research and Development (R&D) techniques based on the ADDIE development model. The ADDIE model is one of the learning system design models which shows the basic steps of a learning system that are simple and easy to learn (Falahah & Irrahali, 2019). The ADDIE design step includes (1) analyzed which was the stage for analyzing existing problems and analyzing suitable product planning so that problems could be solved optimally, (2) designed that was planning media designs which would be used so that learning objectives were achieved by maximum, (3) developed in which previously designed concept would be realized into a product, (4) implemented in which the stage of application of the product that had been produced in the field, and (5) evaluated in which a process of evaluating the product that had been developed. The ADDIE model steps are shown in Figure 1.

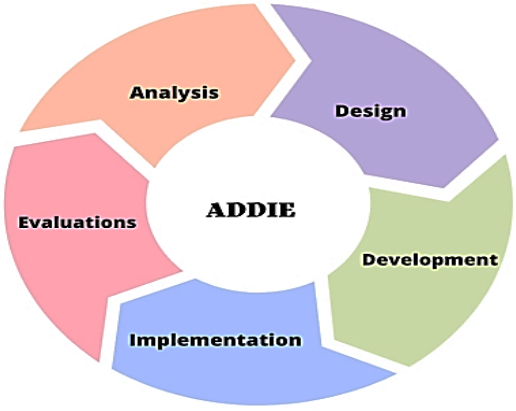

Figure 1. Steps for using the ADDIE model.

Research Subjects

The subjects of this study were 45 grade IV elementary school students from Kuranji State Elementary School. The small group trial phase was conducted on 10 students while the large group trial phase was conducted on 45 students. The development stage consisted of creating a storyboard, collecting supporting data, developing learning media, validating and revising the initial product. The repaired product could then be accessed via a link for small and large group trials. In addition, data from the trials were analyzed and evaluated. The results of the trial evaluation made improvements to digital comic media.

Data analysis technique

Data collection techniques included validation questionnaires from media experts, language experts, material experts, test techniques (pre-test and post-test), and student response questionnaires. The results of validation questionnaire analysis by media experts, language experts and material experts were used to determine the suitability of learning media by using Aiken's validity. The results of the media, language and material expert questionnaire analysis were interpreted by using a Likert scale with a rating scale of 1-4. The score was assessed by using Aiken's validity criteria as shown in Table 1.

Table 1. Aiken's Validity Criteria

Score V	Criteria
0.81-1.00	Very High
0.61-0.80	High
0.41-0.60	Moderate
0.21-0.40	Low
0.00-0.20	Very Low

The results of the students' pre-test and post-test were used to determine the increase in students' technological literacy skills by using the Pearson product moment correlation test in Table 2 and the N-gain test in Table 3.

Table 2. Pearson Product Moment Correlation Criteria

Coefficient Interval	Relationship Level
0.00 – 0.199	Very Low
0.20 – 0.399	Low
0.40 – 0.599	Enough
0.60 – 0.799	Strong

0.80 – 1.00	Very Strong

Table 3. Interpretation of ((g)) values adapted from (Fadaei, 2019)

((g))	Criteria
((g)) < 0.3	Low
0.3 > ((g)) ≤ 0.7	Moderate
((g)) ≤ 0.7	High

The results of student responses to the implementation of digital comic development in science learning materials were transcribed and grouped according to indicators, and then the percentage of answers was calculated. It was interpreted by using a Likert scale with a rating scale of 1-4. The score was assessed by using the response categories as shown in Table 4.

Table 4. Response Categories adapted from (Majdi & Subali, 2018)

Score Percentage	Interpretation
Respon < 50%	Low
50% > Respon ≤ 70%	Moderate
70% > Respon ≤ 85%	High
Respon ≥ 85 %	Very high

Research Stage Based on ADDIE Model Development.

The analysis stage was conducted by analyzing needs through direct observation. In the context of developing digital comics, the analysis stage was conducted by analyzing student characteristics, material analysis and analyzing the competency goals that students intended to achieve. At the design stage, planning learning media aims to prepare, determine the design of learning media or product design and storyboards based on science subject material on alternative energy sources. In addition, the development stage is a step where media experts, language experts and material experts validate the development product in order to obtain suggestions and comments for improving the media.

The implementation stage conducted trials in small groups with a total of 10 students in class IV of elementary school. After the trial, students worked on test questions in order to find out the effect of developing digital comic media in science subjects to improve the information technology literacy skills of fourth grade elementary school students. In addition to the test questions, at the end students filled out a questionnaire in order to find out students' responses to the media 'Energy Digital Comics'. In addition, evaluation at the analysis stage was used to check whether the analysis was feasible until the media developed met learning needs.

RESULTS AND DISCUSSION

The product produced in this development is digital comic media on science subject material on alternative energy sources which was developed by using the ADDIE model. This digital comic media is designed for fourth grade elementary school students, namely in the Science Subject in Theme 2 Always Save Energy which discusses basic competency 3.5 identifying various energy sources, changes in energy forms, and alternative energy sources (wind, water, sun, heat earth, organic fuel, and nuclear) in daily life class IV.

The media was developed through three stages that were analysis, design and development. The first stage, namely analyzed, included several activities, that were (1) analysis of the learning resource needs required by teachers and students, such as the effectiveness of learning theme 2 with textbooks and experience using digital comic media as material for alternative energy sources for class IV elementary school; (2) curriculum analysis; such as, syllabus, basic competencies, indicators, teacher and student books; (3) analysis of student characteristics including student cognition at the concrete operational stage; (4) analysis of the characteristics of digital comic learning media for students. Second, the design stage produced a storyboard in accordance with the basic competencies and learning achievement indicators which had been analyzed.

The third stage namely the developed stage in which to produce or develop learning products in the form of digital comic media

whose validity had been tested through an assessment process from a team of experts, teachers and student responses. Media expert validators validated seven assessment indicators, namely: (1) clarity of story line, (2) way of conveying images, (3) proportional layout, (4) quality of comic images, (5) consistency of button display (6) attractiveness of images and (7) ease of navigation. The indicators for clarity of storyline and proportional layout obtained Aiken's validity of 0.67 in the high category. Meanwhile, the indicators for image delivery method, comic image quality, button display consistency, image attractiveness and ease of navigation obtained Aiken's validity of 1.00 in the very high category. According to Wilya et al., (2023), the creative and colorful display of digital comics makes elementary school students interested in reading and they were motivated to read actively.

Material expert validators validated assessment indicators consisting of (1) conformity of material with lesson indicators, (2) correctness of concepts (definitions, terms, etc.), (3) clear and specific material, (4) clear and systematic material (5) suitability of the comic image to the material. Indicators of concept correctness (definitions, terms, etc.) and suitability of comic images with the material obtained Aiken's validity of 1.00 in the very high category. Meanwhile, for indicators of suitability of material with lesson indicators, clear and specific material and clear and systematic material obtained Aiken's validity of 0.67 in the high category.

Linguistic expert validators validated assessment indicators consisting of (1) interesting, clear and targeted language, (2) appropriate to the student's social and emotional maturity, (3) sequence between sentences in the comic, (4) language appropriate to the student's intellectual level, (5) inter-sentences had an integrated flow of thought, (6) the language corresponds to Indonesian written communication. Indicators according to students' social emotional maturity, language according to students' intellectual level and language according to written communication in Indonesian obtained Aiken's validity of 0.67 with a high category. Meanwhile, the language indicators were interesting, clear and on target, the coherence between sentences in the comic, the inter-sentences had an integrated flow of thought so that Aiken's validity 1.00 was obtained in the very high category. The results of the media validation assessment based on media, language and material are in Table 5.

Table 5. Media Validation Assessment Results Based on Media Experts, Language Experts and Material Experts

Assessment Indicators	Aiken's validity	Cetegory
Media Expert		
Clarity of story line	0.67	High
Way to convey images	1.00	Very high
Proportional layout	0.67	High
Comic image quality	1..00	Very high
Consistency of button appearance	1.00	Very high
Image attractiveness	1.00	Very high
Ease of navigation	1.00	Very high
Suitability of the background used	1.00	Very high
Materials Expert		
Suitability of material to lesson indicators	0.67	High
Concept truth	1.00	Very high
Material is clear and specific	0.67	High
The material presented is systematic	0.67	High
Correspondence of comic images to the material	1.00	Very high
Linguist		
Interesting, clear and targeted language	1.00	Very high
In accordance with students' social emotional maturity	0.67	High

Assessment Indicators	Aiken's validity	Cetegory
Confusion between sentences	1.00	Very high
Language appropriate to students' intellectual level	0.67	High
Inter-sentences have an integrated flow of thought	1.00	Very high
Language appropriate for written communication in Indonesian	0.67	High

The results of the data in the form of input, suggestions and comments given after giving the assessment sheet were used as material for consideration in order to improve the media which had been developed. On the start page of the Energi Digital Comics media section on the topic of alternative energy sources for fourth grade elementary school students there is video guide button which contains how to use the Energi Digital Comics media and the start button, the initial appearance of the comic media section is as shown in Figure 2.

Figure 2. Display of the initial page of comic media

After the initial page of the Energi Digital Comic media section there is an identity page, students should type their name when using digital comic media, as in Figure 3.

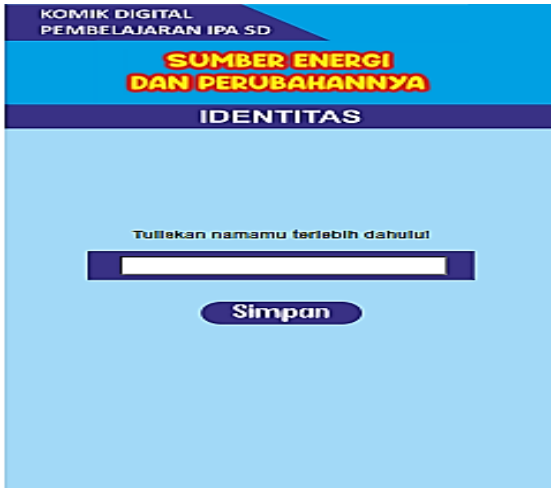

Figure 3. Application identity page display

The Energy Digital Comic media menu page has seven menus, the menu consists of audio greetings from the teacher, ayo membaca menu, video material on energy sources and changes, ayo berlatih, reflection on learning by describing feelings through emoticons, and media profiles. Display menu page shows in Figure 4.

Figure 4. Display of the comic media menu page

Ayo baca komik menu consists of two comic titles, namely playing on the beach and flying kites. The comic entitled playing on the beach contains material about the use of solar energy sources. Meanwhile, the comic title playing a kite contains material about the use of

wind energy sources. The menu display of Ayo baca komik as in Figure 5.

Figure 5. Ayo baca komik menu display

Ayo berlatih menu on Energy Digital Comics media contains practice questions for science subjects on alternative energy sources which consist of 10 multiple choice questions. Ayo berlatih menu display as shown in Figure 6.

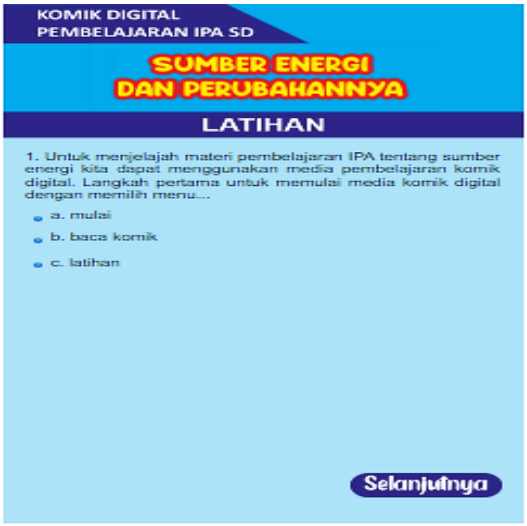

Figure 6. Ayo berlatih menu display

The learning reflection menu by describing feelings through emoticons serves to determine student responses when using Energy Digital Comics media. There are two emoticons namely sad and happy emoticons. Students can choose emoticons based on students' feelings when using comic media. In addition, there is a media profile menu which contains profile information for the creator of the Energy Digital Comics media. Display the learning reflection menu by describing feelings through emoticons and media profiles as shown in Figure 7.

Figure 6. Ayo berlatih menu display

Based on the results of expert validation, there are several revisions. Material expert validators provide suggestions and input for improving digital comic media so that it is more effective when used in research. The suggestions from the language expert validator are as follows: (1) the sound of the music on the menu is too high-pitched at the same time as the explanation/instruction for students. The music can be adjusted to be softer/slower without disturbing the sound of more important explanations. (2) Video material one is not clear. There needs to be an explanation of the relationship between video images and material in order to achieve learning objectives. Meanwhile, suggestions from language expert validators are simple and shorter statements (SPOK) and use more productive language. In addition, according to the media expert validator, the Energy Digital Comics media is good and it can be continued for research.

The effect of implementing the results of developing digital comics in improving the information technology literacy skills of fourth grade elementary school students was assessed by the Pearson product moment correlation test and the N-gain test. Furthermore, forms of pretest and posttest questions for natural science subjects on alternative energy sources and their changes for fourth grade elementary school students. Before the question is tested, an analysis of the items is first conducted. The items to be analyzed were given to 10 students in grade IV at Kuranji State Elementary School. The results of the validity and reliability tests were conducted to determine the level of validity and constancy of the measuring instruments

used. The instrument questions totaled 15 questions, obtained 12 questions which were declared valid with r-count values > r-table and 3 questions were declared invalid with r-count values < r-table.

Thus, the 12 valid questions could be used for research, while the 3 invalid questions would be excluded and not used in research. Valid questions were calculated for reliability by using the Cronbach's Alpha test, by comparing the value of the Cronbach's Alpha coefficient with the reliability standard. The result of calculating the reliability of Cronbach's Alpha is 0.937 which means that the reliability on the criteria is very high.

The effect of implementing the results of digital comic development on the Information Technology Literacy abilities of Grade IV Elementary School Students was measured by using the Pearson product moment correlation test as used in (Risdiana, 2019). The Pearson product moment correlation test requires the data to have a normal distribution. Therefore, before conducting the Pearson product moment correlation test, a normality test was conducted on the implementation data resulting from the development of digital comics and data on students' information technology literacy abilities. Moreover, the significance value of the normality test for the information technology literacy ability variable is 0.053 and the implementation variable resulting from digital comic development is 0.075. Both significance values are greater than 0.050. Thus, the two data are declared to have a normal distribution and the Pearson product moment correlation test can be continued.

The results of the Pearson product moment correlation test show that the implementation of digital comic development results with students' information technology literacy skills is 0.693. Referring to the Pearson product moment correlation criteria, this value lies in the interval 0.600 – 0.799 with strong criteria. In addition, a significance value of 0.000 is obtained, which is smaller than 0.05 so that it can be concluded that the implementation of the results of digital comic development has a significant effect on the information technology literacy abilities of fourth grade elementary school students.

The coefficient of determination of the influence of the implementation of digital comic development results on students' information technology literacy skills is 48.0%. It shows that 48.0% of grade IV elementary school students' information technology literacy abilities are influenced by the implementation of digital comic development results while the remaining 52.0% are influenced by students' ability to use the internet and information technology; such as, using laptops or computers. Not all students have equal experience in using the internet for learning so that to develop literacy in information and communication technology students are a shared responsibility since even though they are individually responsible for their own development, the process sometimes requires assistance from other students who are more experienced. (Saman et al., 2019).

The results of the N-gain test for information technology literacy skills of fourth grade elementary school students are 0.57. Referring to the interpretation criteria for the n-gain value, this value lies in the interval 0.3 – 0.7 with moderate criteria. It means that students experience an increase in information technology literacy skills through digital comic media with moderate achievements. Digital comics can attract students' attention since comic media is clear and easy to understand. Moreover, according to Sumantri & Putri, (2022) interactive digital comics can attract the attention of children in elementary schools (SD); especially, in learning Natural Sciences (Science). Comics can help increase students' interest in learning and support the delivery of science learning concepts.

Students' responses regards to the implementation of digital comic development in energy sources science learning materials for class IV elementary schools were explored by using a questionnaire sheet. Data from the questionnaire sheet results were then transcribed and grouped b theased on indicators, then the percentage of answers was calculated. The

student response questionnaire regarding the implementation of digital comic development in class IV energy sources science learning material in elementary schools consisted of three indicators, namely 1) Showing interest in learning by using digital comic media consisting of two question numbers, 2) Accuracy and clarity of the display of digital comic media consisting of of four questions, 3) Demonstrate the usefulness of learning using digital comic media consisting of four questions. The total questions in the student response questionnaire to the development of digital comics are 10 question numbers.

All items in the student response questionnaire have a percentage with very high criteria. The average percentage value of students' responses to the implementation of digital comic development in science learning materials for energy sources in class IV elementary schools is 94.4%. This value is in the interval 85% - 100% with very high criteria. It means that the students' response to the implementation of digital comic development in the energy source science learning material for class IV schools is in the very high category.

The indicator showing interest in learning using digital comic media receives a positive response with the highest percentage of 99.3% obtained in question number 1 while question number 2 obtains a percentage of 97.9%. In line with research which had been conducted by Megantari et al., (2021) it is stated that learning is more fun, meaningful and students respond positively to the use of digital comic media. Students' positive responses to using digital comic media can be a solution for educators to get used to using technology-based learning media. The research results show that the application of the 'Energy Digital Comic' media increases the information technology literacy skills of fourth grade elementary school students. It is proved by results of trials conducted by obtaining the appropriate criteria.

The research results show that the application of the 'Energy Digital Comic' media increases the information technology literacy skills of fourth grade elementary school students which are proved by the results of research which had been conducted by obtaining appropriate criteria. It is in accordance with research which had been conducted by Ariyani & Ganing, (2021) that stated that media which is combined with text, images, animation and sound/audio can attract students' attention so that students can better understand the learning material.

Audio-visual media is considered the best teaching medium for students in order to increase students' understanding since it can make students easily imagine the real situation and increase their motivation in learning (Harsa et al., 2020). Moreover, digital comics can help students achieve learning goals, improve learning with students' active role during the learning process (Apostolou & Linardatos, 2023). In addition, information and communication technology can improve students' abilities in learning science (Winarni et al., 2020).

CONCLUSION

The conclusion of this study is that the development of digital comic media for science subjects increases the information technology literacy skills of fourth grade elementary school students. It is shown by; (1) the digital comic media being developed is very feasible, based on the results of validity tests which have been conducted by material experts, media experts and language experts. (2) The results of the Pearson product moment correlation test show that the implementation of digital comic development results with students' information technology literacy skills has strong criteria. Thus, it can be concluded that the implementation of the results of digital comic development has a significant effect on the information technology literacy abilities of fourth grade elementary school students. Information technology literacy is influenced by students' ability to use the internet and information technology; such as, using laptops or computers. (3) The results of student responses are very high towards the

implementation of digital comic development in science subject matter in order to improve the information technology literacy skills of fourth grade elementary school students.

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