The Development of Digital Comic as a Learning Media to Enhance Student's Understanding and Awareness on the Topic of Drugs

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ABSTRACT The human mindset significantly affects the progress of Science and Technology. Drugs are one of the examples that result from human complex thought. Lack of understanding of this topic can lead to others experimenting with dangerous psychotropic drugs. Studying sciences using only textbooks will not be imprinted in student memories. Consequently, incorporating media can help the teacher to improve student understanding. This study was aimed to facilitate students' understanding and awareness of the topic of drugs. The ADDIE model is a guideline for developing good media suitable for the topic. The resulting media was judged by an expert, a lecturer, and a teacher, who proceeded to use Index Aiken. The students' responses are gathered using a questionnaire of 20 statements and a Likert scale. The result shows that the lecturer's judgment rater agreement index has a V = 0.9625, indicating a high media score. At the same time, the teacher's judgment has a V = 0.7875, which indicates an average score for the media. The students' responses show that 56.67% of students strongly agree that the comic can facilitate them to understand and be more aware of drugs. The findings show that lecturers and teachers agree that digital comics have the potential to be educational resources that foster comprehension and awareness and help students learn about drugs.

Keywords Digital comic, Drugs topic, Learning media, Students understanding, Students awareness

1. INTRODUCTION

Drugs are one of many examples created by complex human thinking. Drugs are usually known as medicines that are given by the doctor when someone is sick, and drugs are not dangerous if they are used in the right amount that the body needs. But nowadays, there are many modifications in the use of drugs itself. Drugs are usually used by humans and animals (Jørgensen & Halling-Sørensen, 2000). Each drug has its function, whether it's used as a painkiller or a treatment. The often-used type is cough medicine, which gives a high and sleepy feeling even when used with the doctor's recipe. When individuals drink too many drugs outside written by the doctor, it will cause a high feeling. The high feeling is what the drug user is looking for. Drugs provide a pleasant euphoria when dopamine is released. Taking the drug will block the receptors to reabsorb dopamine.

Parents and doctors often initially miss the abuse of these drugs due to the same misconceptions about their potential to cause harm (Levine, 2007). In Indonesia, the analysis of national examination results shows that students lack an understanding of drug materials in junior high school (JHS). The lack of understanding can plunge students into psychotropic drugs that are harmful to their health (Kartina, Suciati & Harlita, 2019). This is what happens in the US, specifically in Fresno, where there are a lot of teenagers who fall into psychotropic drugs simply just because they want temporary happiness and do not consider the danger and the after-effects in the future, which can actually kill themselves or even someone else. One of the psychotropic drugs used is a fentanyl-type anesthetic, which is made in tablet form. Also, there are a lot of death cases caused by drugs like Methamphetamine, Doxylamine, and Alcohol that teenagers consume, with the youngest age at 18 years old (Mims, 2022). As previously described, there are a lot of reasons why Addictive substances or Drugs are essential to be taught primarily to students in their teenage age.

As technology becomes more and more developed these days, it also greatly affects the progress of education. Many new ways of teaching and studying were created. Many teachers develop either a program or teaching technique to help students study. There are now many teachers who use technology in teaching and learning so that many materials that are difficult to understand can be easily explained and visualized. The ideal learning process not only involves students and teachers playing a role, but other components are as important as the involvement of teachers and students, namely the objectives of the learning, the methods used, the materials provided, learning tools such as the media used, and evaluation. (Riyana, 2010) .

Since the COVID-19 case exploded in Indonesia, many changes have occurred in the education world, including the change in online learning. This change requires a lot of technological involvement, such as using wifi communication tools such as laptops, computers, tablets, or cell phones. This change has helped give a new color to the world of education. What used to be learning was only using textbooks; now, many modifications can be used. Learning becomes more interesting and exciting by using visual media. Visual media is a teaching aid used in learning and can be enjoyed through the five senses. Visual media, images, or parables play an essential role in learning. Visual media can help improve understanding and strengthen the students' memories. Visuals can also foster student interest and provide a relationship between the content of the subject and the natural phenomena in the environment (Hidayatul, Mar'atus & Sahal, 2019).

The comic is one of the examples of the development of visual media that can be used in the teaching-learning process. There is a comic called an educational comic. Educational comics are subsets whose purpose is not to tell or entertain but to transfer information or communicate concepts. Reading a comic requires not only the text but also the interpretation of an image as the reader must negotiate two systems of codes, which sometimes function independently and, at other times, interact (McNicol, 2017). Some researchers have strongly argued against using comics as an educational medium. Still, nowadays, many teachers, librarians, and educational researchers design learning activities to take advantage of comics' educational strengths. In 1992 after Art Spiegelman's comic book *Maus* won a Pulitzer Prize in Nazi Holocaust, educational comics became more and more popular. An example happened in 2001 at the University of Minnesota. Physics professor James Kakalios, in his introduction to physics course "Everything I Needed to Know About Physics I Learned from Reading Comic Books", gave an example of basic principles of physics, chemistry, and biology using concepts and characters from the comic books (Vassilikopoulou, Retalis, Nezi & Boloudakis, 2011).

Therefore, this study aims to analyze the development of digital comics as a medium to improve students' understanding and awareness of drugs.

2. METHOD

This research used the Developmental Research method as stated by Seels & Richey (1994) in Richey & Klein (2005) that organized studies to design, develop, and evaluate instructional programs, procedures, and results must meet the consistency and internal effectivity. The author used ADDIE model to develop media products to fulfill the internal consistency and effectiveness of the products produced. The ADDIE model is a model that consists of 5 steps. Analysis, Design, Development, Implementation, and Evaluation. An instructional design model's goal is to ".. provide both an appropriate endpoint and the correct path to lead you there.." or to "..enhance students to ensure that they are teaching the necessary information in an optimum way." Addie's model is one of the instructional design models. It is used to develop the curriculum in various fields (Cheung, 2016). The ADDIE instructional design is a well-known approach to
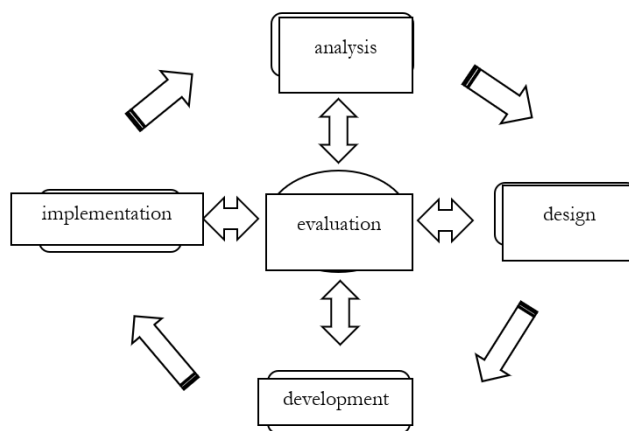

Figure 1 ADDIE model

developing instructional courses and training programs. This helps educators to clearly define the stages in effective implementation of the instruction (Peterson, 2003).

Figure 1 shows ADDIE model in the teaching-learning process improves many aspects, such as the teachers' performance in the class and how students engage in the learning activities. Using the ADDIE model proves that the model can help the quality of teaching-learning in secondary school (Handrianto, Jusoh, Goh & Rashid, 2021).

2.1. Analysis

In the analysis phase, the creators will consider the main target of the audience. Analyses must be conducted to determine the audience's needs (here are the students') by determining what students need to know and already know after the course or the materials given (Peterson, 2003).

2.2. Design

In this phase, there are several key facets. The creator will mainly conduct the research and planning throughout this phase. The planning includes:

1. Identifications of objectives
2. Determining how the objectives will met
3. The instructional strategies that will employed to achieve the objectives
4. The media and methods that will be most effective in delivering the objectives. During the design stage, the creator must consider the data and information from the previous stage. (Peterson, 2003).

2.3. Development

Designers should now develop a product to deliver the information during the development phase by simply referring to the results of the previous two phases. The creator's job changes from research and planning to producing during this transition phase. Drafting, manufacturing, and evaluation are the three areas that are prioritized in the development phase. Designers in this stage develop or select materials and media and conduct formative evaluations (Peterson, 2003).

2.4. Implementation

Creators must play a more active than passive role throughout the implementation phase. With the advent of this phase, the creator's or instructor's job becomes more important. To be delivered efficiently, the product must continue to be evaluated, redesigned, and improved by creators(Peterson, 2003).

2.5. Evaluation

The evaluation phase includes multiple dimensions and is crucial to the ADDIE process. The evaluation phase can be formative evaluations during the development stage, evolving student and teacher support during the implementation phase, and a summative evaluation for instructional improvement after a course or program implementation. The designer must decide whether the problem has been solved (essential to training programs) if the objectives have been accomplished, the impact of the product or course, and the changes that must be made for the program or course to be delivered in the future during the assessment phase (Peterson, 2003).

3. RESULT AND DISCUSSION

The research was done by spreading the digital comic to the targeted students, including junior high school students in the 7th and 8th grades. While for the expert, it's done by giving them the comic to be judged. The output of the expert and student assessments conducted in the five stages of the ADDIE Model are discussed based on the research questions.

3.1 Characteristic development of each comic stage

Analysis stage

The first stage of the ADDIE Model is the analysis stage. This stage explains what should be done before deciding on the media used. This stage consists of the analysis of the reason for choosing the specific topic, which is drugs, the urge to spread it on the internet and social media, the use of the digital comic, the application needed to develop the digital comic (Software use), and lastly the hardware used for developing the digital comic was all done by doing a literature review and study field. All the analyses chosen in this stage will be described below:

The characteristics of the boys and girls and the curriculum used

This school's boys and girls are active and highly curious during the teaching and learning process. The girls are a bit more active than the boys, probably because the number of female students doubles the number of boys. During library time, boys are more interested in reading colors and animated books such as comic or colored reading books. While the girls mostly talk to each other and stay with their phones. However, somehow, during the teaching and learning process, the girl's student will be more active and curious.

The curriculum used in X junior high school is national and international. It uses a Merdeka curriculum and a Cambridge curriculum. The science subject uses a Cambridge curriculum where the topic of the drug wasn't explained deeply but stopped until the antibiotics and how it work in the human body. Another school that still uses Kurtilas or *Kurikulum 2013* has deep material on the topic of the drug.

Analysis of the reason for choosing the topic of the drug

In this stage, the researcher starts to do short research about the cases related to drugs and teenagers. Suddenly, the news about the 'Walking Dead' boomed. Walking Dead is a phenomenon that has suddenly occurred in the United States of America (USA). The sudden viral news shows that many people walk like zombies in the streets. This phenomenon occurs on Kensington Avenue near Delaware River, a famous place where an open market for drug transactions occurs. Along the streets, there are a lot of people who faint and daydream they are drug addicts, and because of that, the place is known as a walking dead area. Before the news of The Walking Dead appeared and was booming, there was a case related to drugs that happened in the United States of America (USA), specifically in an area called Fresno. In Fresno, the youngest age that died from overdose is 18 years old. Both the Walking Dead phenomenon in Philadelphia and the sudden death in Fresno are famous phenomena caused by drugs. The type for both phenomena is different; the walking dead phenomenon is caused by a drug called *Tranq,*

while the sudden death phenomenon is caused by a drug called *fentanyl*.

Fentanyl is usually used to treat pain, mostly used to treat cancer patients or other clinical conditions that are noncancer related, like postoperative pain. Death caused by *fentanyl was* found in the early 1980s. Over time, more and more people took *fentanyl* (Han et al., 2019). On the other hand, *Tranq,* known as a *Xylazine,* is a drug that is usually used for animals and not for humans. *Xylazine* is a veterinary drug that is used as a sedative, analgesic, and muscle relaxant for cows and horses (Ruiz-Colón, Chavez-Arias, Díaz-Alcalá & Martínez, 2014). Both types of drugs have a terrible effect on the human body. *Fentanyl* gives an effect 50 – 100 times stronger than morphine and 30 – 50 times stronger than heroin. While *Xylazine* wasn't made for humans, it had such an effect. *Xylazine,* when used in the long term, will cause a tissue body to die, which means the user doesn't feel any pain even when the skin is blistered and there are open wounds.

In both of the famous cases, there are a lot of teenagers who happened to use drugs as their final decision to feel happy. In other words, drugs are the easiest way for someone who wants happiness, even though it's only temporary happiness. This decision was made maybe because they didn't know the side effects that are given by the specific drugs that are used or what drugs can do to their body in the short or long term. Drugs themselves have a lot of impact on the human body, not only giving the euphoria but also damaging some parts of the body when used in a certain amount.

The social implication is also one of the reasons for choosing drugs topic. The increased number of drug users results in various social problems like crimes and violence. It can also be seen in increased public, social, and healthcare services. The reason someone gets into drugs is also something that can be prevented, such as family issues, no one to talk to, or a lack of empathy. For this reason, the researcher would like to increase the understanding and awareness that can be instilled in children.

Analysis of the Urge to Spread it on Social Media and Internet

The use of internet is like a daily staple food. The Internet is very close to us and always there wherever we are. The internet doesn't mean surfing around the internet to find something through a website. Nowadays, many things can be done using the internet, and one of them is social media. Social media is a thing that can be used when there's an internet.

According to the American Academy of Pediatrics, 22% of teenagers log into their favorite social media ten times daily. Also, 75% of teenagers own their cell phones, from 75% of teenagers that got their cell phone, 54% use it for texting, and 24% others use it for instant messaging (O'Keeffe & Clarke-Pearson, 2011). All the data shows how someone stays on their phone daily and how often they exchange information through texting and messaging

apps. Using this information helps to analyze how people read and get information through social media on their phones.

Some research also shows that using the internet and social media helps to improve their health. It's because people can quickly get information through the internet. However, because of the convenience provided by the internet, children who are teenagers do not know whether the information obtained is valid. That's why internet usage must be monitored by adults, whether they receive or share information.

During the observation in a specifically targeted school, the researcher found that most students have and use their gadgets, either a phone, tablet, or laptop. The students usually look for information on the internet during teaching and learning. That shows how often students stay on their gadgets to open the internet and scroll around.

Analysis of the use of digital comic

During the observation in the specific school, the researcher finds out that most students spend time with their gadgets. Only a few of them were seen in the library during break time. Even when the students have library time, they prefer to do other activities like talking with each other and playing on their phones rather than sit and stay in the library to read a book.

As the observation shows how often students stay with their phones and scroll through social media and the internet, researchers found that digital comics might be one of the best ways to increase their interest in reading. Because digital comic is a comic that can be view everywhere and every time through their mobile phone. The comic itself has a unique characteristic in that there aren't a lot of words contained; instead, many colors and pictures follow it, so studying doesn't feel like a burden at all.
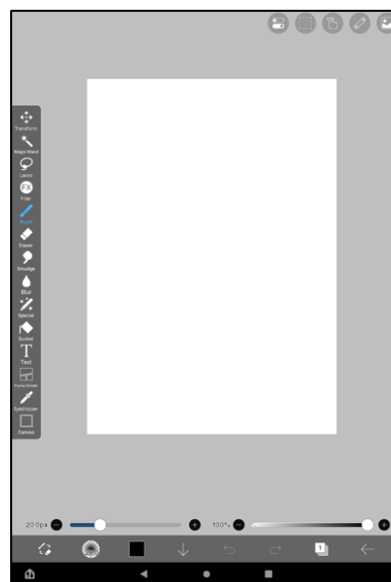
Figure 2 Ibis paintX main drawing screen display

Table 1 AmazonFire HD 10 (2021 11th Generation) Specification

Memory	
Card slot	microSDXC (dedicated slot)
Internal	32Gb 3Gb RAM, 64Gb 3 Gb RAM eMMc 5.1
Platform	
OS	Android 9.0 (Pie),] Fire.OS 7
Chipset	Mediatek MT8183 Helio P60T (12 nm)
CPU	Octa-core (4x2.0 GHz Cortex-A73 & 4x2.0 GHz Cortex-A53)
GPU	Mali G-72

Analysis of the Software Use

The software is Ibis PaintX, offered by Ibis Inc., an application specifically made for artists to draw anime and manga art (Figure 2). Ibis PaintX is an application that offers many features that are very useful and easy to use, even for beginners. It has some features that are unlocked only for the premium user and other features that the free user can use. Ibis PaintX main drawing screen display

Analysis of the Hardware Use

The hardware used in this comic development is an Amazon Fire Tablet 10 with a drawing pencil (Table 1). In this case, the tablet is the easiest and most effective hardware that can be used to draw a whole comic. The comic itself has a hundred untitled canvases consisting of the raw and resulting drawings, which sometimes causes the application to stop running because it's heavy.

Design Stage

In this stage, the researcher focuses on how the comic will turn out by creating a flowchart and storyline. The flowchart and storyline are necessary to create a clear vision of how the comic will be constructed.

Flowchart

A flowchart is a visual representation to document the step-by-step sequences of operations or processes (Chapin, 2003). The researcher used a flowchart to visualize the comic strip outline in this research. The flowchart can be seen in the appendix (Appendix 1).

Storyline

The storyline was made after the flowchart was finished. The storyline developed based on the information represented in the flowchart. The storyline helps bring the flowchart to life by describing the actions or decisions taken at each stage and the outcomes or results achieved. Through the storyline, the reader can follow each progression of the scenes and understand the purpose of each scene.

Generally, flowchart and storyline complement each other. When the flowchart offers a visual representation of the operations of the comic, the storyline provides the context and narrative along with the indicators so the

process can be more understandable and relatable. The storylines can be seen in Appendix 2.

Development Stage

In this stage, the researcher develops the instrument using the chosen application. The first thing to do is for the researcher to start developing each character's characteristics. The development of the character starts by drawing it on paper as the primary reference, then scanning it using any scan application. Then, the ibis Paint X application was used to start making all the drawings digital. All the explanation of this stage will be described below:
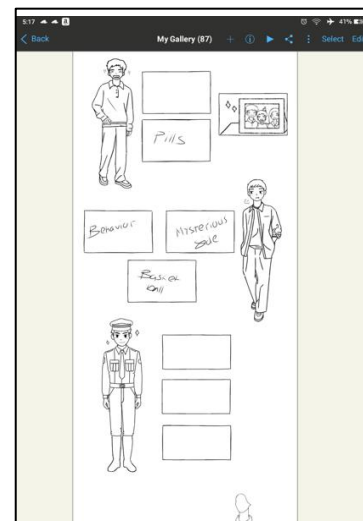
Raw Sketch

This stage was the beginning of all of the designs made
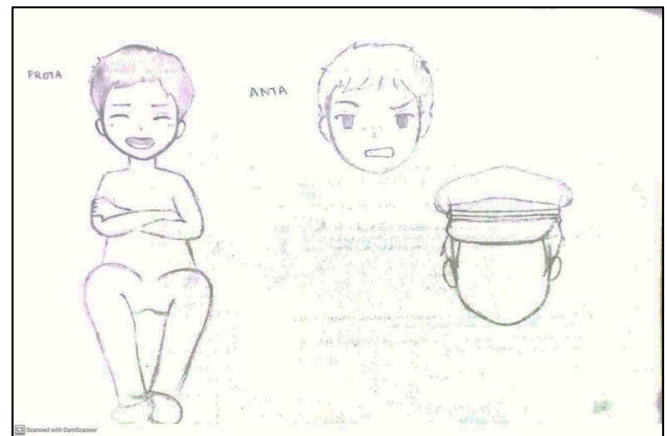
Figure 3 Raw sketch of the comic

before the instrument was finished. The raw sketch is the rough draft with minimal details, the initial stage of the drawing process before getting into the digital process. The raw sketch focused on the composition, proportion, and overall art structure.

The raw sketch helps the creator to experiment with the comic composition and proportion or even the art style. This process helps the creator adjust the comic so the

Figure 4 Soft sketch of the comic

instrument results have a clear direction and foundation. An example of the raw sketch is shown in Figure 3

Soft Sketch Digital

Soft Sketch Digital moves the raw materials into the digital stage by scanning all the raw sketches. The raw picture becomes the reference for future design so that the art style can be constant. The soft sketch moves the raw sketch into digital but has no details, such as the colors, background effect, bubble chat box, facial expression, and emotions.

Soft sketch digital here is a preliminary or rough version of a design, idea, or concept that can be easily modified and adjusted. The researcher called this step a soft digital sketch because the raw sketch has already been changed to the digital form. In this step, as shown in Figure 4, the figure of each character is already shown, but other elements, such as panels and chat box, are not yet shown.

3.1.3.3 Digital step and fixed sketch
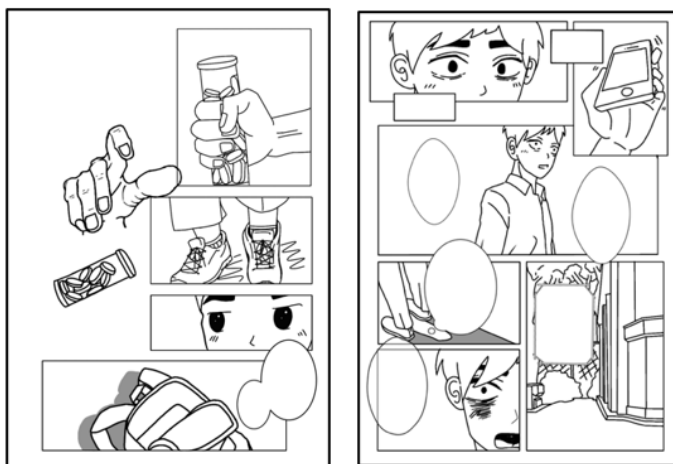
Digital steps are where the creator starts to change

Figure 5 Digital step and the fixed sketch

Figure 6 The final result of the coloring and background of emotional effect

everything and do anything digitally. Using copy-paste features provided in the application, no more using the raw
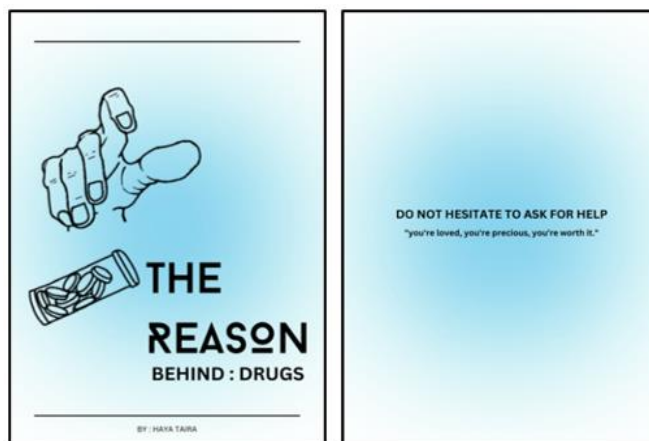

Figure 7 The final design of the cover and the closure page of the comic

sketch as the reference to do the next drawing to make it precise and constant.

All the structures are already structured and positioned with balanced composition from the creator's perspective during this process. However, the creator hasn't put any background or emotional effect into this process yet. That's why emotion can only be seen from the character's expression in Figure 5.

Final Result

The final result (Figure 6) here refers to the complete version of the comic itself, including all the background and emotional effects, coloring, and shading, as well as the complete bubble text and materials that need to be delivered in the comic itself.

The final result also shows the finalization of the cover and the closing of the comic (Figure 7). That includes the title of the comic, the creator's name, and the word that can describe the whole point of the comic. The complete final comic is shown in Appendix 3.

Implementation Stage

The implementation stage refers to a process where the researcher spreads the comic to the experts. Here, expert judgment is divided into two types: the lecturers as the expert judgment and the teachers as the expert judgment. Along with distributing the comic, the researcher also shares the questionnaire containing 4 (four) indicators with 20 (twenty) questions. The aspect is also divided into 4 (four) aspects: the Science aspect, the Art aspect, the Linguistic aspect, and the Awareness aspect. After collecting expert judgment answers, the researcher can spread the comic to the students. Along with the comic, the student has a questionnaire comprising four aspects and 20 statements that need to be done after reading the comic.

Evaluation stage

During this stage, the researcher will start collecting all the expert and student judgments to improve the comic for

the subsequent research by analyzing all the answers the experts and students gave.

3.2 Expert Judgment

Expert judgment is divided into two categories. The first category consists of the judgment from the lecturers, and the second category consists of the teachers' judgment. An expert judgment is involved in validating the instrument to improve the quality either from the content aspect or the drawing aspect and even the language aspect. Expert judgment plays a crucial role in developing and evaluating the instrument. The need for 2 (two) types of experts, consisting of a lecturer and a teacher, is that the lecturer is responsible for the content or materials because they have a wide knowledge and know exactly what Junior High School (JHS) needs to learn. While the teacher is responsible for the class. The teacher is involved directly in the teaching and learning process, which lets the teacher know more about what students are interested in during the studying and learning process. Here, the lecturer and teacher use the same questionnaire rubric. The researcher also provides a suggestion column filled with a short text to help the researcher see the difference between lecture and teacher perspectives.

All the data obtained will proceed using the Aiken index. Based on the index Aiken scoring, the range score of Aiken is between 0 – 1. The V index calculation categorizes an item or device according to its index value. If the index results are around 0.4 or below, it will be considered to have low validity. In contrast, an index between 0.4 – 0.8 indicates moderate validity, and if the index is above 0.8, it indicates a high or very valid validity. The closer the index Aiken resulted to 1, the better the item is because it will be more relevant (Priatna, 2008; Retnawati, 2016). The Expert judgment is targeted to be filled by 3 (Three) Lecturers and 2 (Two) Teachers (Table 2).
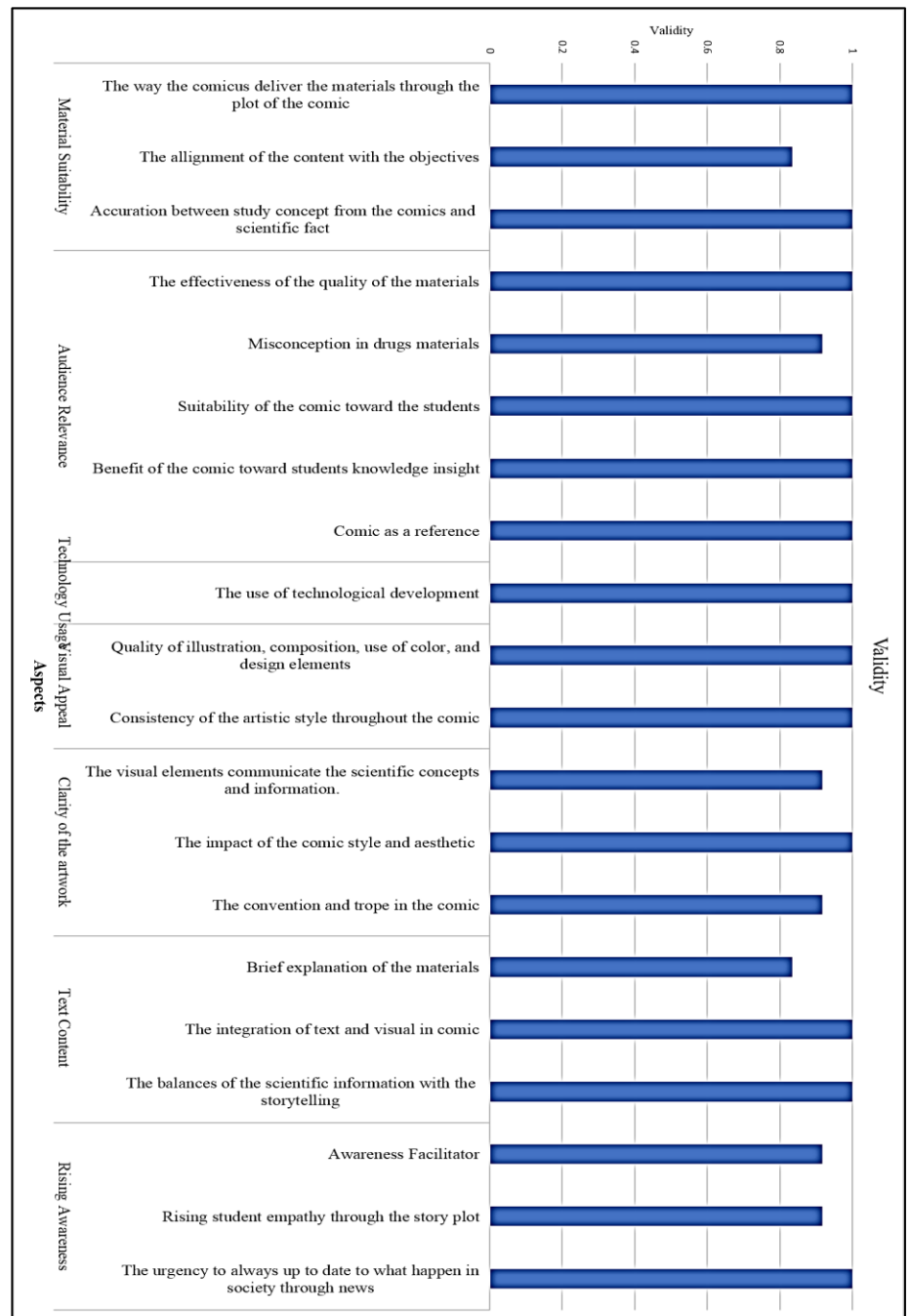
Lecturer Expert Judgement

As described previously, the lecturers become experts in validating the instrument using a questionnaire

Table 2 Lecturer and Teacher Occupation and Expert Fields

No.	Occupation	Expert Field
1.	Lecturer	Computer Science
2.	Lecturer	Biotechnology (Biology)
3.	Lecturer	Biology
4.	Teacher	JHS Teacher
5.	Teacher	English Teacher

containing 20 questions. The result of the V from all questions are shown in Figure 8;

All the data obtained will be processed using an index called Aiken. Expert validation is a process where a


Figure 8 V result from all statement from the lecturer as the expert judgement

qualified and knowledgeable person or a group assesses the accuracy, credibility, and quality of information or materials produced by some other person or system.

Expert Judgment by Lecturer in Science Aspect

The science aspect contains three leading indicators: material suitability, audience relevance, and technology usage. Each indicator contains a specific statement with a 1-5 range score: one is the lowest, and five is the highest. Material suitability contains 3 (three) statements, audience relevance contains 5 (five) statements, and technology usage contains 1 (one) statement. The result of the science aspect validity is shown in Figure 9;
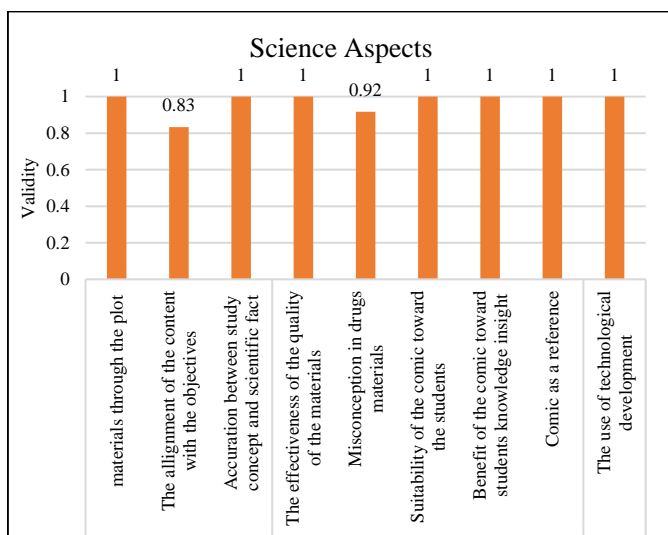
Figure 9 Science aspect from lecturer validity as the expert judgment

As shown in Figure 9, the result of the science aspect from all the lecturers has an average of 0.97, with most statement answers by the lecturer being 5 (five). Index Aiken states that a score above 0.8 can be indicated as a 'high validity'. As the example can be taken from the material suitability aspect in the 'materials through the plot' statement, the validity index is 1, which means 'very valid'. This result can be stated as 'very valid' because it has an index Aiken value of 1. Still, it also can be considered as 'very valid' due to the media's ability to communicate and deliver the materials and create a helpful tool that aids students in better understanding the information, as stated by Darnawati (2019) in Husna & Fajar (2022).

The second statement of the rubric, 'The alignment of the content with the objectives', has a result of 0.83 of the index Aiken, this shows that the result is 'very valid' as a result is still above 0.8 of the index Aiken. This means that the content delivered was aligned with the objectives, this statement is supported by (Porter, Smithson, Blank & Zeidner, 2007), that an aligned instructional guidance system resulting in alignment with the classroom instruction will produce a better result on an aligned student achievement test. In other words, if the instruction

is aligned with the objectives or the targets that have been made before, it will ensure a clear and focused direction of the learning process. It also helps to avoid unnecessary or redundant content.

The third statement of the rubric, 'Accuration between study concept and scientific fact,' means that what the students need to learn is aligned with what happens in real life. Here, the index Aiken value is high, which can be considered as a 'high validity' or a 'very valid' content. This statement is supported by what was stated by Narut & Ntelok (2020) in Husna & Fajar (2022) that science courses, particularly concepts with a lot of visual appeals and real-world (life) applicability, the use of the learning media can be beneficial in helping teachers delivered the materials so it will be more comprehensible. Also, the contextual approach highlights the connection between the subject matter under study and real-life conditions that students can directly observe and analyze, making it easier to understand (Husna & Fajar, 2022).

Going into the second aspect, which is audience relevance, 4 (four) out of 5 (five) statements have a 1 (one) index Aiken, which makes it considered as a 'high validity' or having a 'very valid' content. The first, third, fourth, and fifth statement is connected. All four statements have a very valid index Aiken, which gives them very high validity content. This statement can be supported by what was stated in (Husna & Fajar, 2022). Based on the learning styles, some students mentioned that reading effectively helped them grasp lessons more efficiently.

In contrast, others found that it was simple to comprehend the subject matter if they had a good understanding. The demonstration made the subject matter more accessible for the other students to understand, whereas others found pictures and animations helpful in remembering and understanding the lessons. These statements can be concluded that students have a diverse learning preferences. That's why choosing science learning materials that can accommodate these individuals' needs is essential. Therefore, specific media might help some students understand but not be a helpful source for others. The effectiveness of the media can happen when the learning media can accommodate and facilitate students' curiosity and understanding.

For the 'misconception in drugs topic' statement, it has a 0.92 index Aiken result. It shows that the content has a 'high validity', meaning there are few misconceptions in the media. The complete rubric or blueprint can be seen in the appendix (Appendix 4).

The last statement of the last aspect in the science field is 'The use of technology development', which shows that the creator uses technology development to provide the media to the students. It shows that the statement has a 'high validity' index Aiken, which means the creator takes advantage of the technological developments. As stated by the Indonesian Internet Service Providers Association
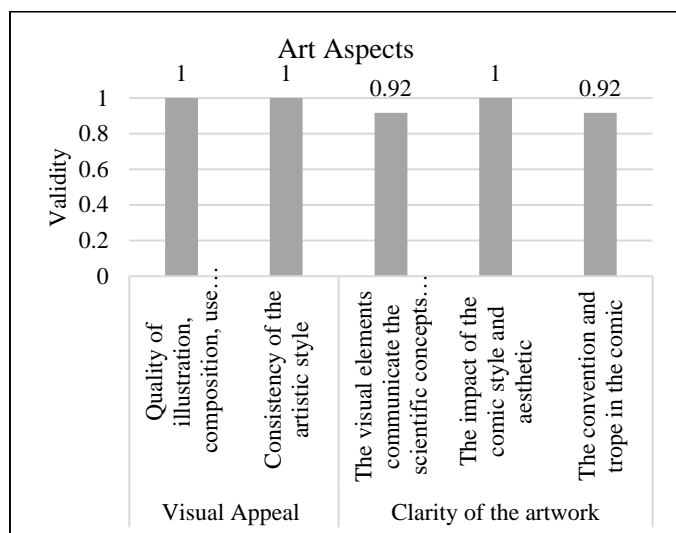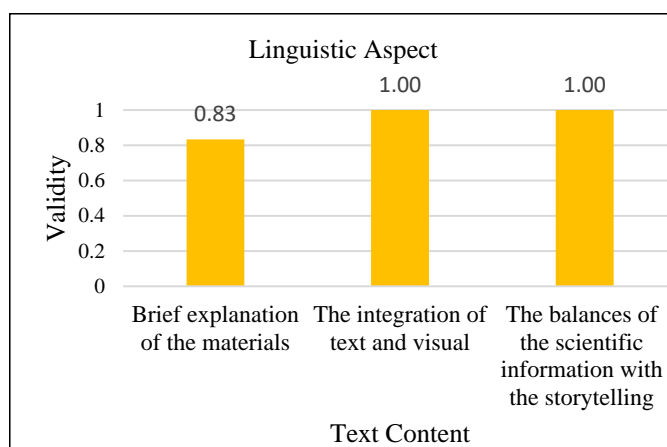
Figure 10 Art aspect from lecturer validity as the expert judgement

Figure 11 Linguistic aspect from lecturer validity as the expert judgement

(APJII) (2020) (Kaloeti, Manalu, Kristiana & Bidzan, 2021), the use of the Internet in school and online learning requires that children are connected to the digital world. During the same period, many internet users in Indonesia accessed online media for educational and school-related purposes.

From the art aspect, there are 2 (two) essential aspects: the visual appeal and clarity of the artwork. Both of the aspects are related to each other. As a result, shown in Figure 10, 3 (three) o f 2 (two) statements have a one index Aiken, which makes it a 'very valid' content, while the other 2 (two) have a 0.92 index Aiken, which makes it also still has a 'very valid' or a 'high validity' content. The visual appeal and the clarity of the artwork are crucial elements when using a digital comic as a medium to communicate science materials because a visual appeal in the comic can capture the audience's attention and make it more enjoyable and engaging in learning. It also helps to explore the science materials further. People also tend to remember visual information better than text information. Using a drawing can help the reader imagine and retain the science content for extended periods, as combining images and text reinforces memory.

The clarity of the artwork in the digital comic sparks interest in science among readers who may not typically engage with scientific materials. It can also present science material creatively and in an approachable way to engage a larger audience. 'The visual elements communicate the scientific concept and information' means each element in the comic can deliver the meaning behind it. It is aligned with the statement, 'Artistry in science involves the ability to perceive patterns, connect various elements, and synthesize diverse information to create a coherent and meaningful understanding'(Eisner & Powell, 2002). When making media or communicating through a design visual,

the creator needs to consider to whom the media targeted (Rodríguez-Estrada & Davis, 2015).

As shown in Figure 11, the text content contains 3 (three) statements, and 2 (two) out of 3 (three) statements have one index Aiken, which is considered as a 'high validity'. In other words, it can called 'very valid' content. The statement 'Brief explanation of the materials' has a 0.83 index Aiken, which can still be considered 'very valid' content. Comics combine both textual information and visual imagery to convey a story message. Through the visual, the reader can get the emotion delivered by the comic's character. Visuals in a comic can complement the text by providing additional details and context. With this combination, the reader can get a more helpful message and concept with a better understanding. The comic excels at creating context and storytelling. The comic can be said to be successful when the comic itself can create a powerful and effective tool for communicating and delivering materials that can be easily understood by the reader.

As shown in Figure 12, all of the statements have an Aiken index above 0.8, which makes them 'very valid' or 'high validity' content. The relation between the use of
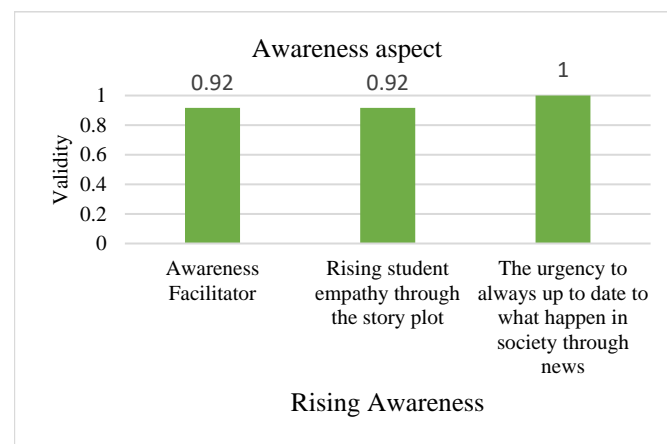
Figure 12 Awareness aspect from lecturer validity as the expert judgement

        125

digital comics as a learning media awareness is that the creator wants to help students better understand the specific drugs and know what might happen in their surroundings. By using digital comics, it can enhance awareness of educational content by making it more accessible to diverse audiences. With a visualization inside, it allows students to gras p and understand the content more effectively.

From all of the lecturer's judgment as an expert's judgment, the result of the V from all the experts can be concluded as 'high validity' or can be considered a very valid content. Some suggestions come from the expert, such as;

"The media is very good and suitable for comic fans. It can be an alternative learning media. The Illustrations of how the drugs works can be further detailed".

From the lecturer's perspective, the comic is already good and can be used to gain students' interest in learning about drugs. There are also some other revision that needs to be done from the lecturer's perspective, such as;

"Comics are still dominantly used to improve students' understanding, while students' attitudes and awareness and students' literacy are not yet clearly presented. According to official sources, it's a good idea to ensure that comics contain indicators of students' attitudes, awareness, and literacy. Official sources should accompany the explanation of material in comics".

From the lecturer's perspective, the comic still needs a revision in the materials to increase student awareness and add more information from the official sources.

Teachers' expert judgement

The rubric that is shared with the teachers is also the same. The teachers involved in this judgment are two teachers: an English teacher and a science JHS teacher. A different perspective can be obtained by involving the teachers in this research. A lecturer is someone who is focused on studying specific fields, which makes them a content validator. At the same time, teachers know the situation in the actual class and how junior high school students are characterized. The category of the teacher judgment is divided into 3 (three) parts: The Validity of all aspects, shown in Figure 13.

As stated, all the data obtained proceed using an index Aiken. Based on the index Aiken scoring, the range score of Aiken is between 0 – 1. The V index calculation categorizes an item or device according to its index value.
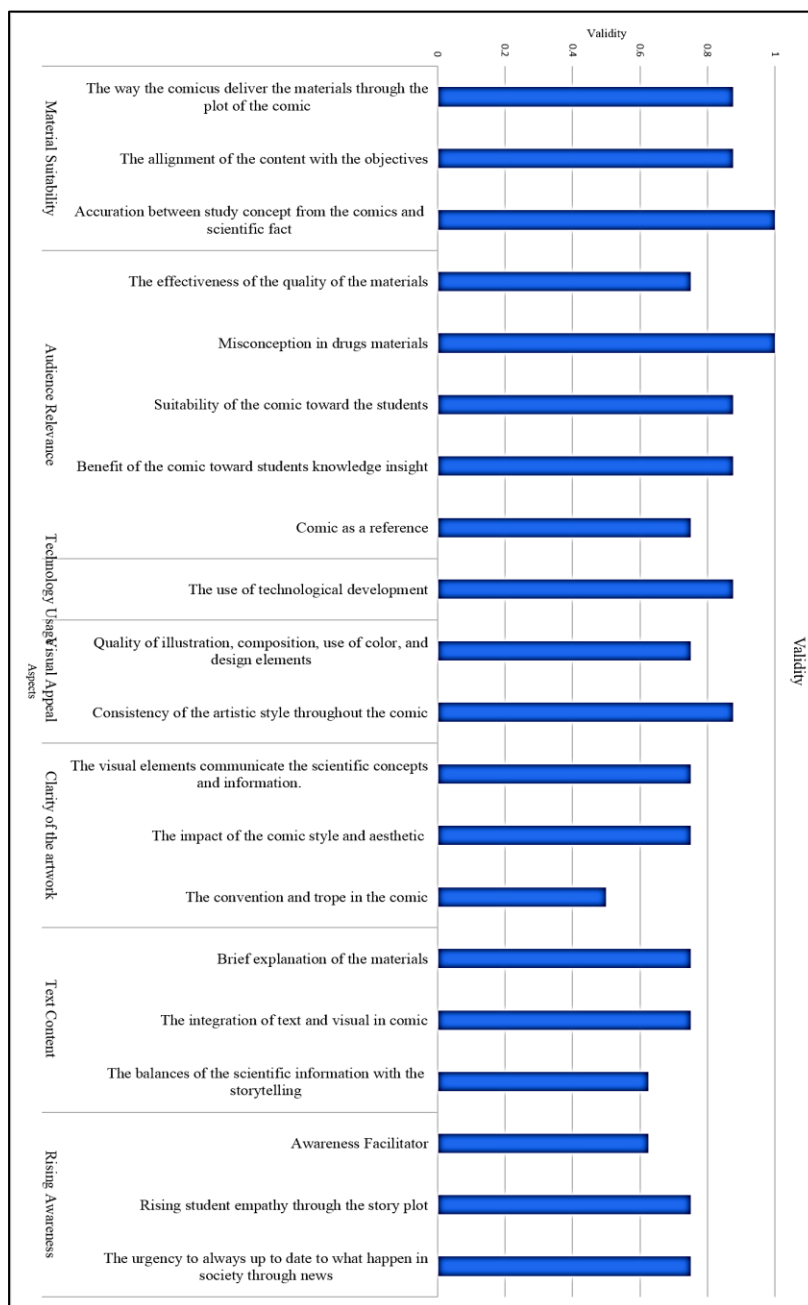

Figure 13 V result from all statement from the teacher as the expert judgement

If the index results are around 0.4 or below, it will be considered to have low validity. In contrast, an index between 0.4 and 0.8 indicates moderate validity, and if the index results are above 0.8, it indicates high or very valid validity (Retnawati, 2016). That result, the closer the result of the index Aiken to 1, the more it can be considered as a 'very valid' content.

From the teacher's judgment (Figure 14), it can be seen that some statements got one as an index Aiken result, which can be considered as 'very valid' content. As stated in the Aiken index, an Aiken index below 0.4 can be stated as a 'low validity' or 'not valid'. In contrast, the index between 0.4 and 0.8 can be considered 'valid', and the index
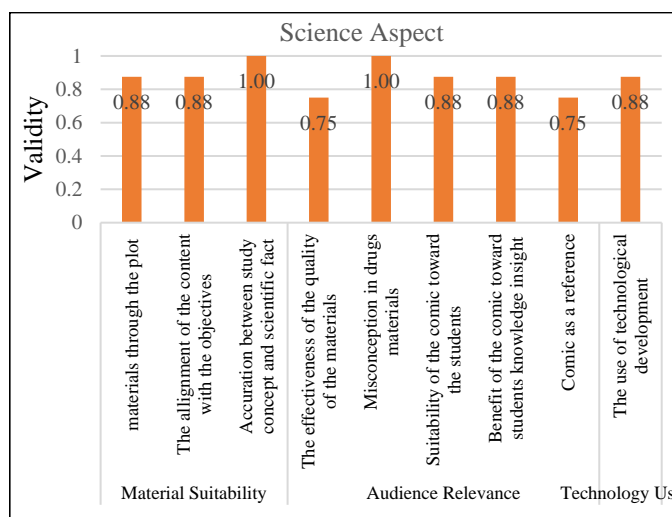
Figure 14 Science aspect from teacher validity as the expert judgement
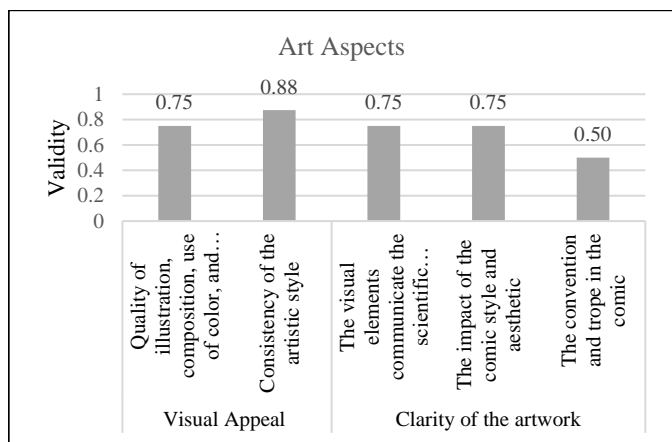
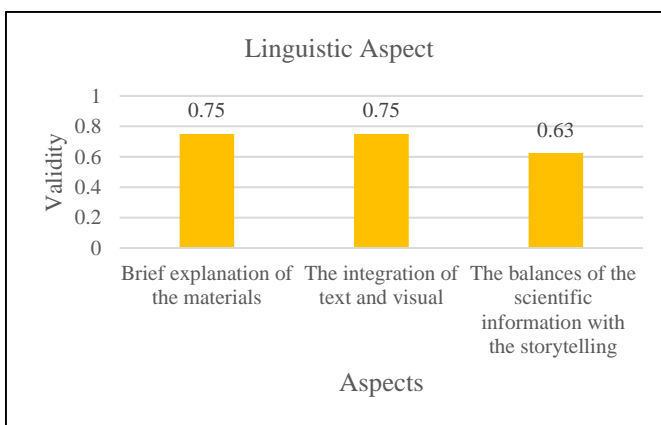**Figure 15** Art aspect from teacher validity as the expert judgement

above 0.8 can be stated as 'very valid' or 'high validity' content. Some statements also have an Aiken result index below 0.8 but above 0.4. The statement with a value below 0.8 is the 'the effectiveness of the quality of the materials' statement and the 'comic as a reference' statement.

During the previous COVID-19 pandemic, teachers must create interactive me dia that can be used to teach. The media should be used primarily on digital media, such as video, e-books, websites, or online games (Husna & Fajar, 2022). After the pandemic, many students are not interested in learning; they only use books. Teachers must still make interactive media to help grasp student understanding and curiosity. Teachers know how effective the media can be if used in their classes. As shown in Figure 14, the statement of 'the effectiveness of the quality of the materials' and the 'comic as a reference' have an index Aiken result of 0.75, still considered as 'valid' content.

Figure 15 shows that most of the statements are still considered valid because the value is still between 0.4 and 0.8 for the Aiken index. The data above shows that the 'The convention and trope in the comic' statement has an index

Aiken in 0.50. It is considered 'valid' content but exceeds 0.4 points, which can be considered 'not valid' content.

The connection between art and materials is stated in 'The visual elements communicate the scientific concept and information', meaning each element in the comic can deliver its meaning. It is aligned with the statement, 'Artistry in science involves the ability to perceive patterns, connect various elements, and synthesize diverse information to create a coherent and meaningful understanding' (Eisner & Powell, 2002). As stated before, this study's validity of the instrument's content was established by assessing the agreement among the experts. The expert agreement is relied upon to determine content validity because it confirms that the instruments accurately measure the intended abilities or traits. The index of Aiken validity is employed to gauge the level of the agreements among these experts (Nabil, Wulandari, Yamtinah, Ariani & Ulfa, 2022). Here, the teachers, as the experts, agree that there is still a lot lacking in the art aspect of the comics.

Figure 16 Linguistic aspect from teacher validity as the expert judgement

What is shown in Figure 16 can be considered as 'valid' content because it has an index Aiken value between 04 – 0.8. The text that is provided in the comic is complementary to the visual that appears. As stated by (Fatimah, Santiana & Saputra, 2019), even if comics only show a few words with many pi ctures, teachers can still use this media to teach some elements of language. Teachers can also use comics as a media that can help improve students ' skills: listening, understanding, reading, oral interaction, speaking, and writing. Having a media with fewer words but a lot of colorful drawings will attract students' attention and curiosity to learn about it. As stated in the previous line, the words that appear in the comic are not only a material delivered but also complementary, where students can understand specific elements such as emotion.

Figure 17 shows the result of the Validity of Awareness aspect. Here, it shows that the three statements have an index Aiken value between 0.4 – 0.8, which can be considered 'valid' content. Both teachers agree that the
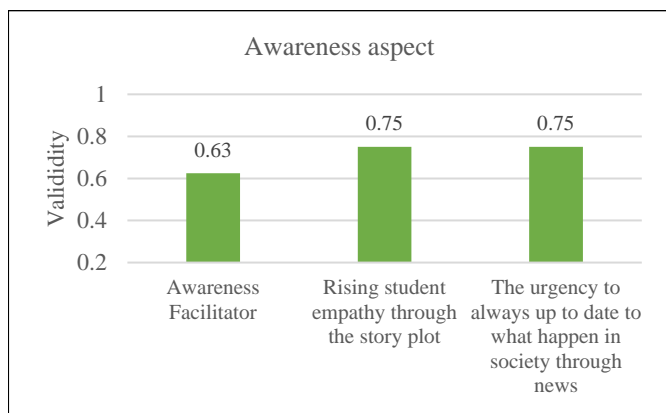
Figure 17 Awareness aspect from teacher validity as the expert judgement

Figure 18 Pie chart of the percentage of the range score appears

digital comic might help increase students' awareness. This result is also aligned with the statement, 'short story can give important content in raising cultural awareness, linguistic awareness, motivation, and are claimed to improve all the students four skill which is listening, reading, speaking, and also writing' (Fatimah, Santiana & Saputra, 2019). In this case, the creator of the digital comic wants to make sure that the student will be motivated not to get near or try to approach the drugs, as stated in the digital comic.

These are all the results of the four aspects of the teachers' expert judgment. There is also some response in the written section regarding the comic, which;

"It's my first time to read comic contains with educational purpose especially in Indonesia itself. thank you for the experience for letting me to read t his, it's all great!".

Students Responses

Student responses are valuable feedback that can be used to improve the learning media. Here, the student's questionnaire consists of 20 statements with the score range using the Likert scale. The likert scale measures individuals or groups' attitudes, opinions, and perceptions regarding a specific phenomenon of interest. It consists of a 5 (five) range scale that can be written as SA = 5, A = 4, N = 3, D = 2, SD = 1 (Priatna, 2008). The complete rubric of the student's questionnaire responses will be shown in the appendix (Appendix 5). The result of the student's responses to the digital comic is shown in the table 3;

Table 3 Result of the frequency of each category

Interval	Category	f	%
00	Strongly Agree	17	56.67
69 - 84	Agree	10	33.33
53 - 68	Neutral	1	3.33
37 - 52	Disagree	2	6.67
20 - 36	Strongly Disagree	0	0.00
Total		30	100

It can be shown that the students mostly agree with the specific statement because the result of the strongly agree
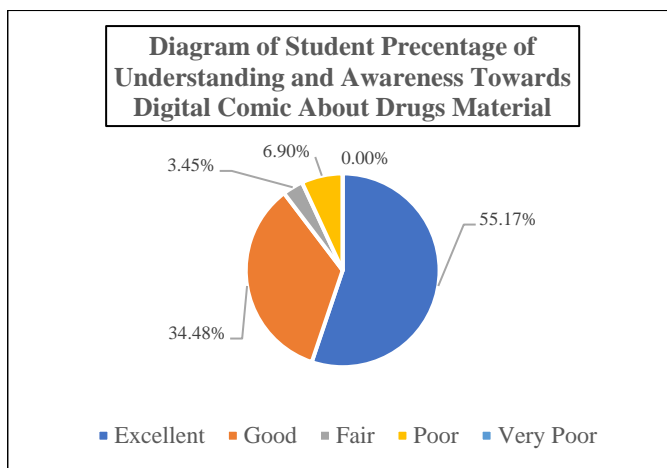
appears in more than 50% of the other statements. Here's how the percentage of the answer appears on the pie chart Figure 18,

While the results of the students after filled out the questionnaire can be categorized as a.

Table 3 Result of the Output of the Students Score Range Category

Interval	Category	f	%
100	Excellent	17	53.33
69 - 84	Good	10	33.33
53 - 68	Fair	1	3.33
37 - 52	Poor	2	6.67
20 - 36	Very Poor	0	0.00
Total		30	100

Table 4 of the student's score range category output shows that after reading the comic and filling out the questionnaire, 16 Excellents came out; there were also ten total Good and 1 Fair. The percentage is shown in the Figure 19.
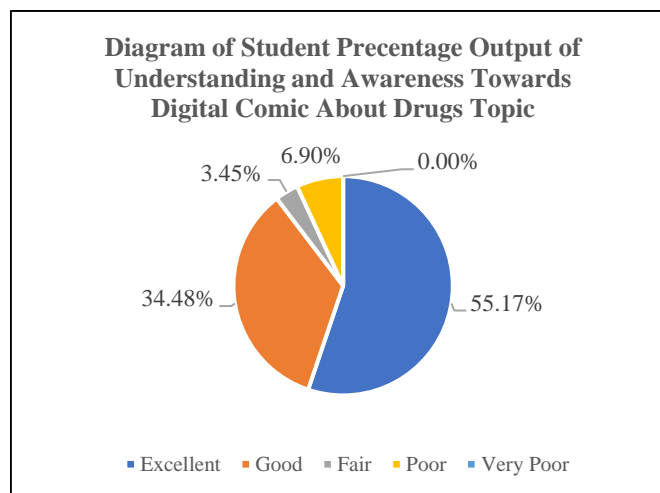

Figure 19 Pie chart of the percentage of the range score output of the students

Figure 19 shows that 59.26% of the students got an Excellent result, which means 17 of the students strongly agree with most of the statements included in the questionnaire. From the chart, we can also see that ten students got a 'Good' score on the output of the questionnaire, which means the students agree with almost all parts of the statement inside the questionnaire. One student got a 'Fair' result in the questionnaire output, which can be considered a 'Neutral' with what is stated inside the questionnaire. The other two students got a 'Poor' result in the questionnaire output, which can be considered as 'Disagree' with some parts of the statements inside the questionnaire.

The students' responses show that most students like the art drawing and how the materials are delivered through the comic. It helps the students to learn more about drugs and grasp the information quickly. Some comments also show that the panel and the bubble chat box are confusing, and some grammatical errors appear. Aside from that, students also find out how important it is to share information about the drugs with family and friends.

There's also a comment that shows how the student feels while reading the comic, such as;

"In my opinion is because that I don't really like comics, the comic itself cannot be said to be good or not because it's depending on the use of the reader."

What shows in the comment is that the student suggests that not all the students like to read a comic, so the comic can be helpful to depending on the students themselves, whether they like to read the comic or not. From the students' responses, the researcher found out that the students would like to share the information so that everyone will be aware of drugs;

"I'm surprised at the good comic, which remind us danger of drugs. I just thought that drugs have bad influence for us, but I learned that we should share the information of drugs with our friends and family. thank you"

All the responses and suggestions from the students show that they find the comic useful for learning something new, even with the complex terms they never heard before. But it was also a bit confusing because the panel and the bubble chat box didn't show which was the first and where the students needed to read. The language barrier can also be a factor in the student's understanding when the teachers share the comic with the students because it's not only the comic in English but also because there are a lot of new terms that the student should learn.

4. CONCLUSION

This research focuses on developing digital comics through the stages of the ADDIE model that will be used as learning media to enhance student's understanding and awareness of the topic of drugs.

This comic was assessed by experts, including lecturers and teachers, and then processed using the Aiken Index.

Student responses were collected using a questionnaire of 20 statements and a Likert scale. The result shows that the lecturer's judgment rater agreement index has a $V = 0.9625$, indicating a high media score. The teacher's judgment has a $V = 0.7875$, indicating an average media score. The results from the lecturers and teachers show that the comic is an exciting medium to use during the teaching and learning process. The content of the comic itself is still lacking in helping students improve their awareness and attitudes towards drugs because the content of the comic still focuses on helping students' understanding. Nonetheless, comics are a good and exciting method to use as a learning medium and a new experience that helps improve students' understanding. The findings show that lecturers and teachers agree that digital comics have the potential to be an educational resource that fosters understanding and awareness and helps students learn.

While the student response shows 56.67% of students strongly agree that the comic can facilitate them to understand and be more aware of drugs, it shows that learning by using a comic is fun and interesting also coupled with visualization of certain scenes, makes it easier to understand because the drawing shows some visualization for the difficult materials. However, there are still some shortcomings, such as the panel and bubble chat box being cluttered, so it is a little confusing to start reading. Students also still have difficulty understanding new unfamiliar terms and language full of English. On the other hand, the research shows how students now understand that it is important to always be up to date with the current situation of our environment and how useful it is to always spread real information to family and friends.

REFERENCES

Budiman, H. (2017). Penggunaan media visual dalam proses pembelajaran [Use of visual media in the learning process]. *Al-Tadzkiyyah: Jurnal Pendidikan Islam*, *7*(2), 171-182.

Chapin, N. (2003). Flowchart. In *Encyclopedia of computer science* (pp. 714-716).

Cheung, L. (2016). Using the ADDIE Model of Instructional Design to Teach Chest Radiograph Interpretation. *Journal of Biomedical Education*, *2016*, 1–6. https://doi.org/10.1155/2016/9502572

Eisner, E., & Powell, K. (2002). Special series on arts-based educational research: Art in science?. *Curriculum Inquiry*, *32*(2), 131-159.

Fatimah, A. S., Santiana, S., & Saputra, Y. (2019). Digital Comic: An Innovation of Using Toondoo as Media Technology for Teaching English Short Story. *English Review: Journal of English Education*, *7*(2), 101. https://doi.org/10.25134/erjee.v7i2.1526

Han, Y., Yan, W., Zheng, Y., Khan, M. Z., Yuan, K., & Lu, L. (2019). The rising crisis of illicit fentanyl use, overdose, and potential therapeutic strategies. *Translational psychiatry*, *9*(1), 282. https://doi.org/10.1038/s41398-019-0625-0

Handrianto, C., Jusoh, A. J., Goh, P. S. C., & Rashid, N. A. (2021). Using ADDIE model for designing instructional strategies to improve

teaching competency of secondary schools teachers. *Proceeding Webinar Konvensyen Kaunseling Kebangsaan Kali Ke*, *22*, 361-371.

Hidayatul, B., Mar'atus, S., & Sahal, H. (2019). Penggunaan Media Visual dalam Meningkatkan Minat Belajar Siswa. *Universitas Muhammadiyah Sidoarjo*.

Husna, A., & Fajar, D. M. (2022). Development of Interactive Learning Media Based on Articulate Storyline 3 on Newton's Law Material with a Contextual Approach at the Junior High School Level. *IJIS Edu : Indonesian Journal of Integrated Science Education*, *4*(1), 17. https://doi.org/10.29300/ijisedu.v4i1.5857

Jørgensen, S. E., & Halling-Sørensen, B. (2000). Drugs in the environment. *Chemosphere*, *40*(7), 691-699.

Kaloeti, D. V. S., Manalu, R., Kristiana, I. F., & Bidzan, M. (2021). The Role of Social Media Use in Peer Bullying Victimization and Onset of Anxiety Among Indonesian Elementary School Children. *Frontiers in Psychology*, *12*. https://doi.org/10.3389/fpsyg.2021.635725

Kartina, A. A., Suciati, S. S., & Harlita, H. H. (2019). Analisis hasil ujian nasional materi zat aditif dan zat adiktif smp di surakarta [Analysis of the results of the national exam on additives and addictive substances for junior high schools in Surakarta]. In *Prosiding SNPS (Seminar Nasional Pendidikan Sains)* (pp. 162-167).

Levine, D. A. (2007). 'Pharming': the abuse of prescription and over-the-counter drugs in teens. *Current opinion in pediatrics*, *19*(3), 270-274.

McNicol, S. (2017). The Potential of Educational Comics as a Health Information Medium. *Health Information and Libraries Journal*, *34*(1), 20–31. https://doi.org/10.1111/hir.12145

Mims, M. (2022). *Fresno County Sheriff's Office 2020 Coroner Unit Statistics*.

Nabil, N. R. A., Wulandari, I., Yamtinah, S., Ariani, S. R. D., & Ulfa, M. (2022). Analisis indeks Aiken untuk mengetahui validitas isi instrumen asesmen kompetensi minimum berbasis konteks sains kimia [Analysis of the Aiken index to determine the content validity of the chemical science context-based minimum competency assessment instrument]. *Jurnal Penelitian Pendidikan*, *25*(2), 184-191. https://doi.org/10.20961/paedagogia.v25i2.64566

O'Keeffe, G. S., & Clarke-Pearson, K. (2011). The impact of social media on children, adolescents, and families. *Pediatrics*, *127*(4), 800-804. https://doi.org/10.1542/peds.2011-0054

Peterson, C. (2003). Bringing ADDIE to life: Instructional design at its best. *Journal of Educational Multimedia and Hypermedia*, *12*(3), 227-241.

Porter, A. C., Smithson, J., Blank, R., & Zeidner, T. (2007). Alignment as a Teacher Variable. *Applied Measurement in Education*, *20*(1), 27–51. https://doi.org/10.1080/08957340709336729

Priatna, B. A. (2008). Uji Coba Instrumen Penelitian dengan Menggunakan MS Excel dan SPSS. *no. November*, 1-22. http://file.upi.edu/Direktori/FPMIPA/JUR._PEND._MATEMATIKA/196412051990031-BAMBANG_AVIP_PRIATNA_M/Makalah_November_2008.pdf

Retnawati, H. (2016). *Analisis kuantitatif instrumen penelitian (panduan peneliti, mahasiswa, dan psikometrian)*. Parama publishing.

Richey, R. C., & Klein, J. D. (2005). Developmental research methods: Creating knowledge from instructional design and development practice. *Journal of Computing in higher Education*, *16*, 23-38.

Riyana, C. (2010). Komponen Pembelajaran. *Online. http://kurtek. upi. edu/psb*.

Rodríguez-Estrada, F. C., & Davis, L. S. (2015). Improving Visual Communication of Science Through the Incorporation of Graphic Design Theories and Practices Into Science Communication. *Science Communication*, *37*(1), 140–148. https://doi.org/10.1177/1075547014562914

Ruiz-Colón, K., Chavez-Arias, C., Díaz-Alcalá, J. E., & Martínez, M. A. (2014). Xylazine intoxication in humans and its importance as an emerging adulterant in abused drugs: a comprehensive review of the literature. *Forensic Science International*, *240*, 1-8. https://doi.org/10.1016/j.forsciint.2014.03.015

Vassilikopoulou, M., Retalis, S., Nezi, M., & Boloudakis, M. (2011). Pilot use of digital educational comics in language teaching. *Educational Media International*, *48*(2), 115-126. https://doi.org/10.1080/09523987.2011.576522