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Ecoliteracy-Based on Digital Storytelling Comic Media for Elementary School in Indonesia

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Abstract. Science education is very important to educate individuals with the knowledge, skills, and mindset that are required in the 21st century (Sadera et al., 2020). It is essential to have a foundation in education which promotes scientific literacy, not only improves academic performance but also nurtures curiosity, scientific methods, and develops skills for both classroom and field studies (Havu-Nuutinen et al., 2021; Alan & Mumcu, 2022). Science education is needed to help students understand scientific ideas, so they can keep up in a technology-driven world and make a positive impact in the future (OECD, 2023). However, most of the problems that students have with learning science are related to the availability of learning media. Digital storytelling which is a modern version of traditional storytelling, is becoming more popular as an teaching tool. It improves science learning by combination of media and storytelling which makes learning more interesting while still encouraging students to be creative, think critically and understand the complex concepts. This study identify classroom needs and challenges to explore digital comics utilization as an innovative teaching tool for elementary school students. This research uses a 4D model (define, design, develop, and disseminate) with 30 third grade students and 4 homeroom teachers reviewing and evaluating comic media involving experts' validation. This study employs qualitative descriptive research using questionnaires and interviews. The result of this research was very feasible, as shown by the validation result of 91.83% from the media expert and 92,71% from the material expert, students' questionnaire responses aligned with the study's objectives, with a mean percentage of 91.27%, while teachers' responses were slightly higher at 91.818% and confirmed the need and potential of incorporating digital comics and storytelling into science learning. This concludes that digital comics with visual storytelling can be used as creative teaching tools to help students get better understanding and learning the science concepts.

Keywords: Science education; Digital comic; Storytelling; Elementary school students; Innovative teaching tool.

1. Introduction

The Natural and Social Science (IPAS) curriculum undergoes changes to address contemporary issues. IPAS wants to encourage students to be interested in and learn about life, nature, and things that are relevant to all individuals, which supports the goals of sustainable development (Rahmawati, et al.; 2023). The development of digital storytelling comic media in learning science for elementary school students, which promote eco-literacy, holds significant importance and aligns with the United Nations' Sustainable Development Goals (SDGs) (United Nations, 2015). Basic scientific methods are used to teach students how to think critically, analyze, and develop clear conclusions, but teachers and school principals are worried that if the kurikulum merdeka (Indonesia's Independent Curriculum) is implemented, students might not have enough materials or have trouble comprehending science learning materials (Magfira, et al., 2023; Alfatonah, et al., 2023).

Students will learn fundamental literacy abilities that will help them in more advanced classes in junior high school (Wijayanti & Ekantini, 2023). For learning to work well in IPAS, textbooks, observation, and learning materials need to

be well organized. Elearning and network connectivity have made it more realistic to improve dynamic teaching in an e-learning environment Herlina et al., 2024).. People need to be directly involved in order for learning resources to work. Dynamic, inspiring, exciting, and challenging learning processes are needed to get students to actively participate (Azizah, et al., 2024; Setiawan et al., 2023; Nugroho, 2021; Wulandari, 2021). Science education is very important to educate individuals with the knowledge, skills, and mindset that are required in the 21st century The dynamic and challenging nature of today's environment requires an educational foundation that promotes scientific literacy, and early childhood science education is an essential starting point. It not only improves academic performance but also fosters curiosity, instills scientific methods, and develops skills for both classroom and field studies (Havu-Nuutinen et al., 2021; Alan & Mumcu, 2022).

Guided inquiry teaching enhances these advantages by encouraging exploration, questioning, and the development of creativity, critical thinking, and problem-solving skills (Sidek et al., 2020). In elementary school, the Science Learning Capability uses the scientific method to cultivate fundamental cognitive skills and instill scientific characteristics such as curiosity and keen observation (Nur'ariyani et al., 2023). Furthermore, responsibility is an ongoing topic of investigation in this context. To improve overall comprehension and critical thinking, effective science education instruction should include a variety of Nature of Science learning (Wilcox and Lake, 2018; Brock & Park, 2022).

In the 21st century, we need new ideas as quickly as posible that are based on scientific research. To be useful in today's world, people need to know about science and technology. There is more to science than just memorizing facts, so schools need to help students to undestand scientific concepts in our tech-driven world and make a positive difference (OECD, 2023). Therefore, formal schools nowadays emphasize the development of critical thinking, creativity, collaboration, communication, computational skills, and compassion. These six competencies are collectively known as the 6Cs of 21st Century Education (Inganah, 2023) and require educators to be mentally prepared to effectively apply these concepts (Upadhyay, Singh, & Lohani, 2023). In order to support the development of 21st-century skills, especially the 6 Cs, it is important for elementary schools to incorporate the 6 Cs into their curriculum to provide elementary school students with suitable learning opportunities. Also, assessing the effectiveness of recommended interventions is crucial to evaluating their impact on promoting the 6 Cs and transformative learning (Fadhilawati, 2023). The biggest challenge experienced by students in acquiring scientific knowledge depends on the availability and quality of learning materials and the media of learning (Sadera et al., 2020).

Assignments, teaching materials, and methods used by teachers are very important for stimulating students' curiocity and making connections between what they learn at school and the outside world (Letina, 2023). Cartoons on concepts and science have the potential to improve learning by combining engagement, visual appeal, and critical thinking. Particularly in primary science classrooms, they promote critical thinking, engage students, and expose misunderstandings. Science cartoons provide a dynamic and engaging learning environment that is appropriate for students of all ages by promoting STEAM principles and encouraging engagement in disciplines like biology and engineering (Haas et al., 2023). It is vital to include contemporary, dynamic experiences in STEM education since traditional teaching techniques might result in low proficiency in science learning. The goal of technology-assisted learning in STEM fields is to improve students' ability to use different representations of real-world or abstract things and to create simulations. These cutting-edge tools have the power to change the dynamics of teaching and learning, improving the effectiveness and engagement of education (Çetin, 2023; Marques et al., 2023; Siong et al., 2023; Önal, 2023)

The use of educational media contributes to the creation of a stimulating and innovative learning environment by encouraging curiosity, comprehension, and the ability to engage in lifelong learning (Bungawati & Rahmadani, 2023; Rukayah, 2022; Lubis et.al. 2023; Zuniari et.al. 2022; Antara & Dewantara, 2022; Rohmiyah & Sakti, 2022). Stories have been a way to share information and experiences for centuries, with digital storytelling (DS) transforming the process. Key elements include plot, structure, characters, dialogue, conflict, resolution, and point of view. In science classes, stories help break down complex topics, aiding younger students in remembering abstract ideas. They appeal to people of all ages and cultures (Chang & Chu, 2022; Göksün & Gürsoy, 2022; Zhang and Bowman, 2022).

Digital storytelling, a modern version of traditional storytelling, enhances science education by integrating multimedia and storytelling, creating a fun and engaging learning environment for environmental issues (Andriopolou et.al. 2022). Digital storytelling (DST) is a growing educational tool that combines digital technology with storytelling to promote critical thinking, creativity, and understanding of complex ideas (Suzuki et.al., 2018). DST has evolved from traditional storytelling to an interactive learning tool, allowing teachers to keep students interested and help them understand complex concepts (Kogila et.al., 2020). Digital comics, which combine visually appealing graphics with story-based storytelling, create a dynamic and interactive learning environment, making the classroom more effective and

enjoyable (Rahiem, 2021; Darici, 2023). Teacher competency is the ability that teachers must have as a form of fulfilling quality standards that must be met including pedagogical competency. [U.Herlina et al., 2024]

The learning process is more engaging with digital comics because they mix interesting images with narrative storytelling and realistic storylines. The connection with TPACK helps students learn how to use technology, be digitally literate in areas like knowledge, media, and communication (Abosede, 2023). Digital storytelling helps students learn manys skills, including multitasking skills and 21st-century skills, and connect with existing knowledge by combining imagination and technology. It also encourages interactive learning and makes connections with existing knowlegde (Hermiyati et.al.,2023; Lashari,2022; Calik & Seckin-Kapucu, 2021). The use of digital comics and storytelling in the classroom is a strategic approach aimed at third-grade students, focusing on the human-environment relationship (Fitri et al. 2023). The approach involves creating interactive, visually appealing comics using multimedia components, ensuring accessibility through user-friendly platforms and clear instructions (Fitria et al., 2023; Shahid & Khan, 2022; Karantalis & Koukopoulos, 2022). Regular feedback from teachers and students helps improve learning materials and instructional strategies, ensuring a thorough learning experience for students.

2. METHODS

This is a research and development study that made an innovative digital comic with storytelling to be used as a teaching and learning tool to teach third-grade elementary students about science concepts presented in the IPAS book. In this study, the media development process involved utilizing the Clip Studio Paint EX platform with the XP Pen and a digital drawing pad. The research focused on third-grade students in elementary scholl. The instruments employed for data collection included students questionnaires and expert validation questionnaires. The data analysis process unfolded through various stages, encompassing interviews, observation, and documentation. This research uses a 4D model (define, design, develop, and disseminate) were used to make the digital comic. These frameworks systematically guide the development of this comic from analysis to evaluation. The study employs qualitative descriptive research using questionnaires and interviews.

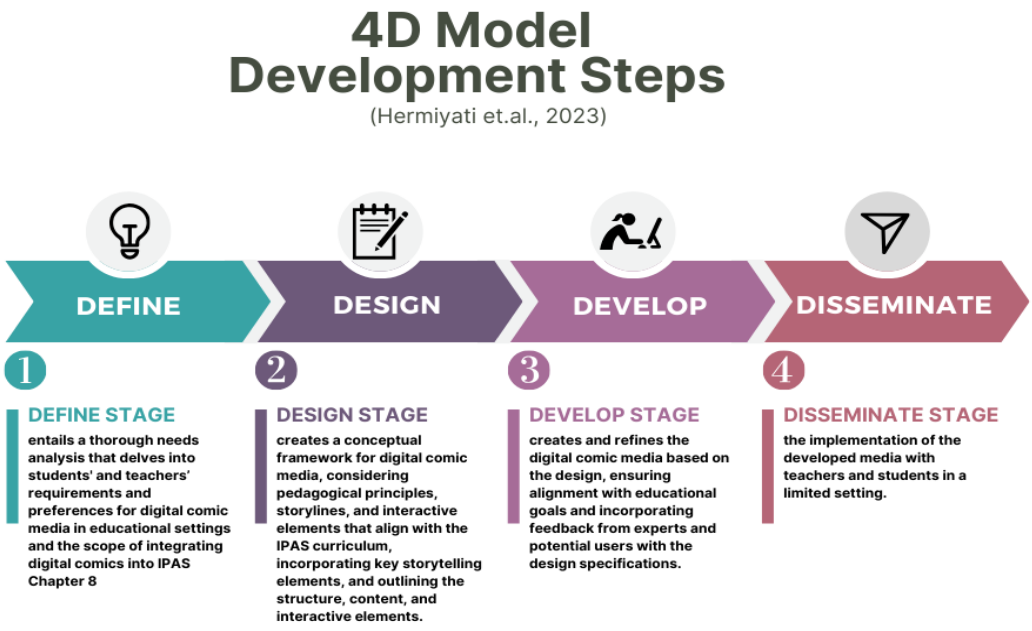

Figure 1. 4D Model Development Steps

Descriptive statistical analysis was used to look at the data that was collected, which included the questionnaire answers. For the needs analysis, qualitative descriptive analysis was used to make sense of the qualitative data that came from questionnaires and interviews. In addition, the Likert scale was used to analyze the questionnaire data, giving a percentage-based breakdown and in-depth information about the results. The percentage to interpret the student response scores obtained through questionnaires utilizing the Likert scale assessment is carried out as follows:

$$Percentage = \frac{Number\ of\ data\ collection\ scores}{Criteria\ score} \times 100\%$$

Table 1. Interpretation of Student Response Scores

Percentage (%)	Category
0 % - 25 %	Very Unneeded / Not Feasible
26 % - 50 %	No Need / Less Feasible
51 % - 75 %	Need / Feasible
76 % - 100 %	Desperately Needed / Very Feasible

3. RESULT AND DISCUSSION

The data collection methods were an interview and a questionnaire. During the define stage, a survey was administered to a sample of 30 fifth-grade elementary students and 4 homeroom teachers. The purpose of the questionnaire was to gather information about the needs and preferences of students and teachers regarding the use of digital comic media in educational settings, as well as the potential for incorporating digital comics into IPAS Chapter 8. Before data collection, the questionnaire instrument validated by experts. The expert was a media specialist affiliated with the Department of Education Technology at the Faculty of Basic Education, Jakarta State University.

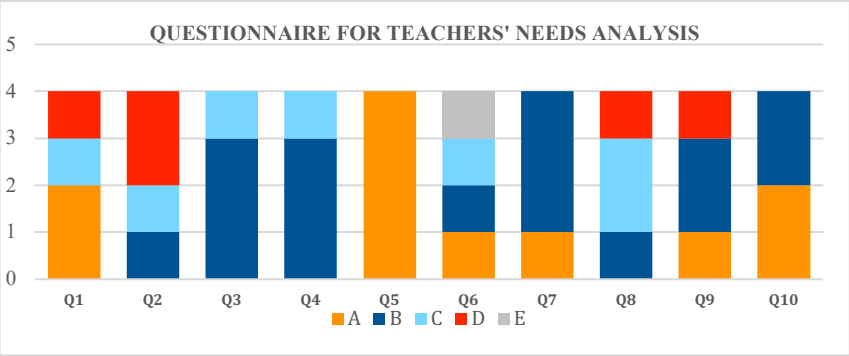

Figure 2. Questionnaire for teachers' analysis result

The statistical chart in Figure 2 illustrates that Q1–Q10 are the questions that were asked for teachers. These questions included those about their current needs, tasks for teaching and learning, and the state of their classrooms and schools. Meanwhile, A, B, C, and D represent the answers that led to the choices made by the teachers. In order to give a visual representation of the teachers' comments, the charts organize the responses to the specific questions asked in the survey into groups.

The interviews with teachers revealed that they use various learning tools and media in schools, including OHP, PowerPoint, moving pictures, photos, and videos, to make learning activities more interesting. However, time is a significant challenge when using these media. Despite projectors and blackboards being the most common tools, teachers are using both text and video for communicative learning. They find it difficult to teach topics from the IPAS textbook on their own and have no formal training in creating comics for students. Interestingly, two teachers strongly agreed that using comic-based learning materials could increase student interest in school.

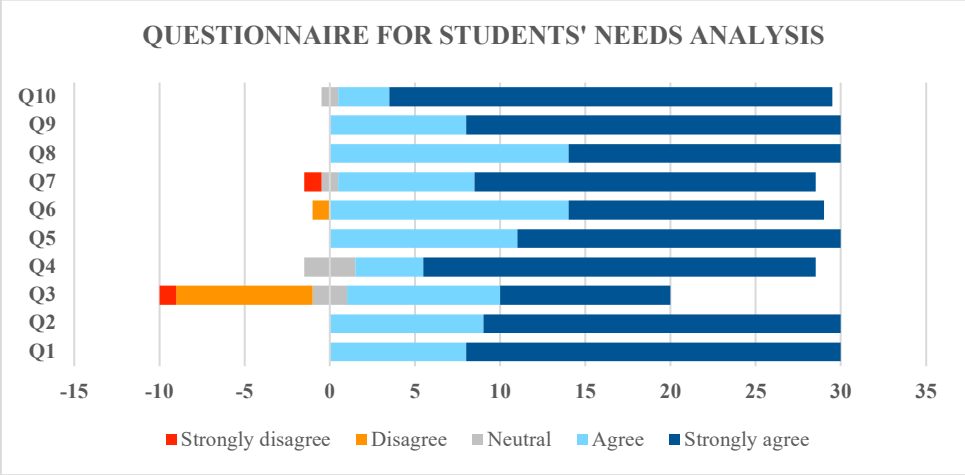

Figure 3. Questionnaire for students' need analysis result

The data presented in Figure 3 above shows a high level of agreement among students regarding their responses to questions Q1–Q10 in the questionnaire. In particular, the data reveals that most students hold strong agreement with different aspects concerning learning media and its influence on their learning experiences. Question that were asked can be seen in Table 2.

Table 2. Questionnaire for students' need analysis

QUESTIONNAIRE FOR STUDENTS' NEEDS ANALYSIS						
Number	Questions	Strongly agree	Agree	Neutral	Not Agree	Strongly Not Agree
Q1	The learning media makes the learning atmosphere more enjoyable.	22	8	0	0	0
Number	Questions	Strongly agree	Agree	Neutral	Not Agree	Strongly Not Agree
Q2	The learning media with the assistance of visuals or pictures makes the lessons easier to understand	21	9	0	0	0
Q3	My teacher has provided innovative learning media in the classroom	10	9	2	8	1
Q4	I prefer learning using illustrated comics rather than text alone	23	4	3	0	0
Q5	I feel motivated to learn when using illustrated comics.	19	11	0	0	0
Q6	The presence of images in the comic helps me remember information better.	15	14	0	1	0
Q7	In school, there are facilities and technology available for using learning media.	20	8	1	0	1
Q8	The learning media in the form of comics helps me better	16	14	0	0	0

	understand lesson concepts.					
Q9	The illustrated comic makes learning more engaging and enjoyable.	22	8	0	0	0
Q10	The comic can be used as a learning tool in schools	26	3	1	0	0

Figure 4 below, illustrates the comparison of student responses, which span from "Strongly Disagree" to "Strongly Agree." The high prevalence of dark blue in Figure 3 indicates that a significant majority of students strongly agree.

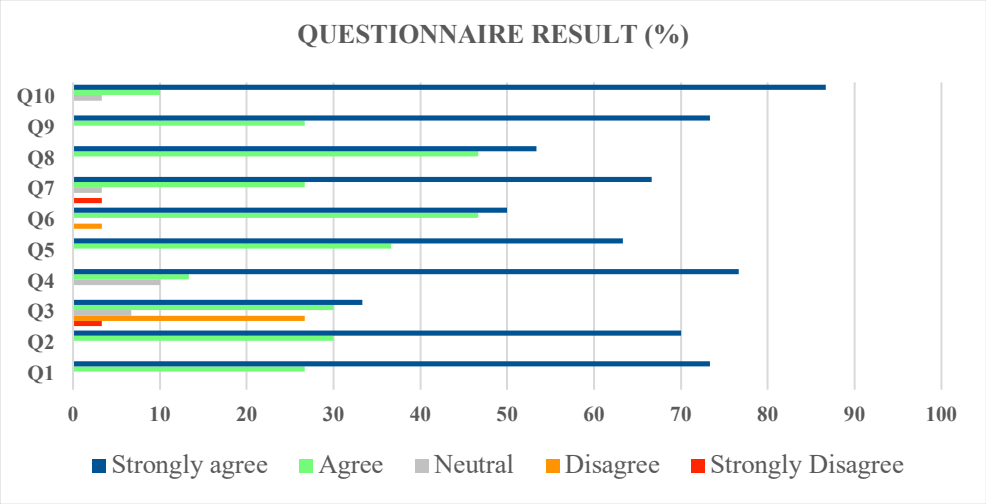

Figure 4. Questionnaire Result (%)

The supplemental data is presented in the table below:

Table 3. Percentage of Likert Scale on Students' Questionnaire

Question	Strongly Disagree	Disagree	Neutral	Agree	Strongly agree
Q1	0	0	0	26,67	73,33
Q2	0	0	0	30	70
Q3	3,33	26,67	6,67	30	33,33
Q4	0	0	10	13,33	76,67
Q5	0	0	0	36,67	63,33
Q6	0	3,33	0	46,67	50
Q7	3,33	0	3,33	26,67	66,67
Q8	0	0	0	46,67	53,33
Q9	0	0	0	26,67	73,33
Q10	0	0	3,33	10	86,67

The significant number of "Strongly Agree" responses is seen across different questions, indicating the strong tendency of students to agree with the statements. In Table 3 below, Q1–Q10 are the questionnaire questions, and R1–R30 are a list of the 30 students who filled out the questionnaire. The data was then combined based on their answers. After that, the average percentage was found by figuring out the response scores from the students on the Likert scale, which gave a score of 90.87%.

Table 4. Respondents answers & Mean Percentage

Res	**Respondents' answers**	Total	Maximum	Percentage	**Mean**

pondent	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Score	Score	(%)	**Percentage (%)**
R1	5	4	5	5	4	5	5	5	4	5	47	50	94	
R2	5	5	5	5	5	5	5	5	5	5	50	50	100	
R3	4	5	4	3	4	4	5	4	5	5	43	50	86	
R4	4	4	5	4	5	4	5	5	5	5	46	50	92	
R5	5	4	5	5	4	5	4	5	5	5	47	50	94	
R6	5	5	4	5	5	4	5	4	5	5	47	50	94	
R7	5	5	4	5	5	4	5	4	5	5	47	50	94	
R8	5	5	5	5	5	5	4	4	5	5	48	50	96	
R9	5	5	4	5	5	5	5	5	5	5	49	50	98	
R10	5	4	5	5	5	5	4	4	5	5	47	50	94	
R11	5	5	5	5	4	4	5	4	4	5	46	50	92	
R12	5	5	5	5	4	4	5	4	4	5	46	50	92	
R13	5	5	3	4	4	5	4	5	4	5	44	50	88	
R14	5	5	3	4	4	5	4	5	4	5	44	50	88	
R15	5	4	4	5	5	5	4	5	5	5	47	50	94	
R16	4	5	2	3	5	2	3	4	4	3	35	50	70	**90,87**
R17	5	5	2	5	5	5	4	5	5	5	46	50	92	
R18	5	5	1	5	5	5	5	4	5	5	45	50	90	
R19	5	4	4	4	5	5	5	5	5	5	47	50	94	
R20	5	4	4	3	5	5	5	5	5	5	46	50	92	
R21	4	5	2	5	5	4	5	5	5	4	44	50	88	
R22	5	5	2	5	4	4	5	5	5	5	45	50	90	
R23	5	5	2	5	5	4	5	5	5	5	46	50	92	
R24	4	4	2	5	5	4	1	4	4	4	37	50	74	
R25	5	4	5	5	5	5	4	4	5	5	47	50	94	
R26	4	5	5	5	4	4	5	4	5	5	46	50	92	
R27	5	5	4	5	4	4	5	4	5	5	46	50	92	
R28	5	5	4	5	5	5	5	5	5	5	49	50	98	
R29	4	5	2	5	5	4	5	5	5	5	45	50	90	
R30	4	5	2	5	4	4	5	4	4	4	41	50	82	

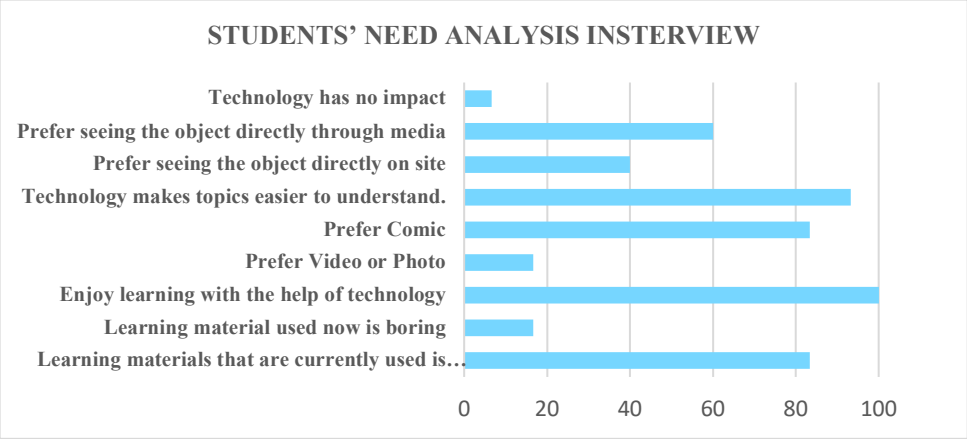

Figure 5. Students' Need Analysis Interview

Figure 5 shows a thorough summary of the results collected through the interviews done with students. After conducting the interviews, the collected data was systematically coded and grouped, leading to the identification of nine distinct groups of responses given by the students. The response groups contain the diverse opinions and preferences expressed by the

students regarding their learning experiences and the role of technology. The response groups that have been identified are listed in table 5 below:

Table 5. Student's Responds on Interview

Number	STUDENTS' RESPONDS	Percentage
1	Learning materials that are currently used is fun	83,33
2	Learning material used now is boring	16,67
3	Enjoy learning with the help of technology	100
4	Prefer Video or Photo	16,67
5	Prefer Comic	83,33
6	Technology makes topics easier to understand.	93,33
7	Prefer seeing the object directly on site	40
8	Prefer seeing the object directly through media	60
9	Technology has no impact	6,67

On the Design Stage creates a conceptual framework for digital comic media, considering pedagogical principles, storylines, and interactive elements that align with the IPAS curriculum, incorporating key storytelling elements, and outlining the structure, content, and interactive elements. The media development process involved utilizing the Clip Studio Paint EX platform with the XP Pen and a digital drawing pad. The design draft can be seen in figure 5 below.

Figure 5. Comic Design

Soon after these changes were made, the updated version of the comic was tested and proven to work by students, who were the intended audience. This repeated process of testing, revising, and validating the final product made sure that it met educational goals and was a useful and interesting resource for fifth grade elementary students

Figure 6. Revised and Finished Comic Design

The finished and final design of the comic can be seen in Figure 6. This finished comic design is the result of careful planning, creative execution, and repeated improvements. The visual parts of the comic, like the drawings, color schemes, and layout, are carefully put together to make it look better and be easier to read overall. This final design clearly includes interesting characters, interesting plots, and funny jokes, which makes sure that the comic not only effectively conveys educational information but also provides an enjoyable reading experience for the intended audience. The finished design of the comic is a big step forward in the development process. It is now ready to be evaluated and tested further to see how well it meets the educational goals for fifth-grade students.

The validation process for this study faced certain challenges, preventing it from being validated by both media and material experts. The timing of the validation process, which took place right before the semester ended, was a major factor in this limitation. As the semester came to an end, time constraints prevented the creation of the validation tools required for expert validation and the comic's subsequent validation. These timeline restrictions left little time for developing and putting into practice the tools and protocols required for an exhaustive and efficient validation process. Though this was a setback, the difficulties this phase presented provide insightful information about the significance of proper time management and planning for upcoming research projects, guaranteeing a more thorough and fruitful validation process. Even though time constraints made it hard to get validation from media and material experts, the validation process wasn't completely slowed down. Instead, validation by students, which was an important part of the evaluation, went well. The students' answers during this validation process provided valuable perspectives on the effectiveness, engagement, and comprehension of the digital comic as a teaching and learning tool.

In Table 5 below, R1–R30 are a list of the 30 students who filled out the questionnaire. The data was then combined based on their answers. After that, the average percentage was found by figuring out the response scores from the students on the Likert scale, which gave a score of 91.82%.

Table 6. Validation by Students

Respondent	Total Score	Maximum Score	Percentage	Respondent	Total Score	Maximum Score	Percentage	Mean Percentage
R1	49	55	89,09	R16	50	55	90,90	
R2	52	55	94,54	R17	51	55	92,72	
R3	51	55	92,72	R18	50	55	90,90	
R4	52	55	94,54	R19	52	55	94,54	
R5	49	55	89,09	R20	53	55	96,36	
R6	52	55	94,54	R21	46	55	83,63	
R7	52	55	94,54	R22	52	55	94,54	
R8	47	55	85,45	R23	53	55	96,36	**91,27**
R9	48	55	87,27	R24	52	55	94,54	
R10	46	55	83,63	R25	55	55	100	
R11	50	55	90,90	R26	52	55	94,54	
R12	52	55	94,54	R27	52	55	94,54	
R13	47	55	85,45	R28	47	55	85,45	
R14	51	55	92,72	R29	50	55	90,90	
R15	55	55	100	R30	47	55	85,45	

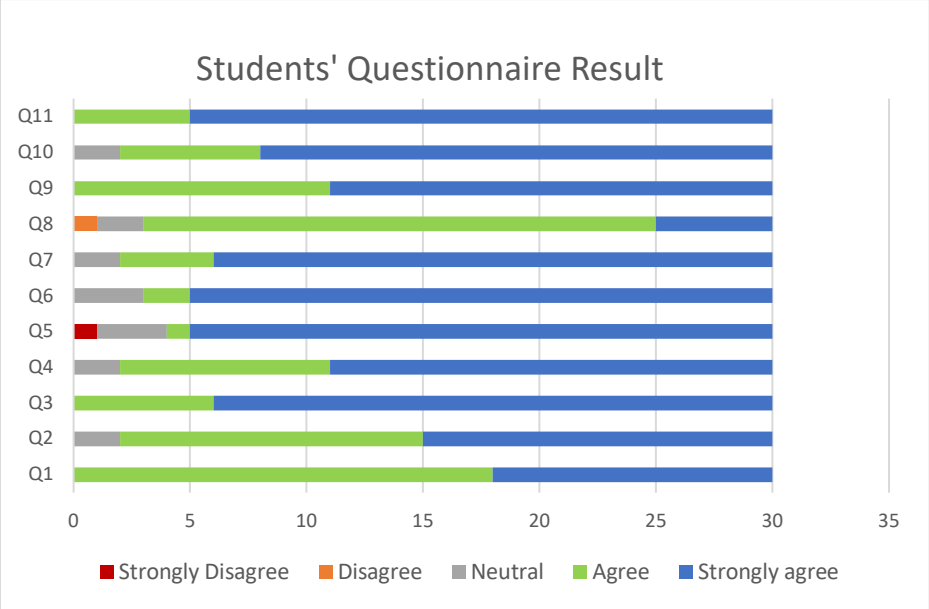

Figure 7. Students' Questionnaire Result

Table 6. Teachers' Questionnaire Result

Teacher's Questionnaire Result				
	Total Score	Maximum Score	Percentage	Mean Percentage
G1	50	55	90,91	**91,818**
G2	48	55	87,27	
G3	54	55	98,18	
G4	50	55	90,91	

DISCUSSION

A comprehensive needs analysis is conducted during the first Define Stage to determine teachers' and students' requirements and preferences for digital comics in the classroom. This analysis explores the use of media and tools in classroom settings. The teacher interviews, as shown in Figure 1, offered insightful perspectives on current procedures, highlighting the pressing requirement for the creation of laboratory and experimental resources to improve the overall attractiveness of educational activities. Teachers utilize a wide variety of media, adjusting their use to subject matters, such as projectors, PowerPoint presentations, movies, photos, and videos. One major obstacle, though, is the time constraints involved in integrating these media forms into teaching practices. Though projectors and whiteboards are still widely used, the value of integrating text and video for communicative learning is becoming more obvious. This thorough examination of media consumption and educational tools establishes the foundations for future improvements in creating materials and instructional strategies.

The information in Table 2 shows a broad and consistent trend in the opinions that students gave, showing that they had a very positive view of using learning media in the classroom, especially illustrated comics. A significant number of students held a strong opinion that learning media improves the learning environment as it is and that the utilization of visuals or illustrations along with knowledge helps in learning and understanding. Additionally, there is an apparent preference among students to learn through illustrated comics rather than just reading text-based materials. Also, a large majority of students are confident that incorporating illustrated comics into school contexts not only makes learning more fun and interesting for everyone but also proves that comics are a good way to learn at school. The fact that nearly all of the students agreed that comics could be used as a learning tool demonstrates widespread acceptance and appreciation for this innovative teaching method. The students suggest that illustrated comics serve as a beneficial instrument for enhancing their comprehension across various subjects, offering both educational value and enjoyment. Adding visual storytelling elements to the learning process has been shown to get students more interested, help them understand, and keep them engaged.

The interviews with students show that they have a positive view of using technology in school, which shows that they are becoming more interested in new ways to learn, especially those that involve technology. For example, in Figure 4, 93.33% of students say that technology helps them understand different subjects better. This shows that students are very enthusiastic about how technology helps them learn. Additionally, a large majority of students say they would rather read comics than watch videos or view pictures. These results show that students are eager to use technology, which shows that it has the potential to make learning more fun and easier.

A mean score of 90.87% on the students' need analysis survey shows how important it is to have digital comics with visual story elements right away. Table 1 shows that the percentage of students who think the media is "desperately needed" is between 76% and 100%. Percentages falling within this range on the interpretation scale mean that the media is desperately needed. It's clear from this study that adding digital comics with visual stories to schools is important and feasible, as both students and teachers are excited about adding an innovative approach to fifth-grade science education as presented in the IPAS book.

The wide range of responses from students about the comic shows that everyone welcomed it, with a large majority expressing satisfaction. Students especially like how interesting the information is, which shows how well the comic can grab and keep their attention (Kogila et.al., 2020). This positive review includes the visual aspects, with acknowledgement for the great use of colors and the high quality of the images shown. Another excellent element is the background design, which makes reading even more enjoyable. Students also compliment the comic for having an easy-to-follow plot, which shows how important it is to have a story that makes sense. The characters' unique and interesting traits also make the comic interesting. Overall, the students agree that the comic is not only visually appealing and of high quality, but it is also fun and interesting to read. In addition, many students say that the comic is entertaining and that it is easy to understand what it discusses.

The mean percentage of answers from students' questionnaires is 91.27%, which clearly shows that digital comics with visual storytelling elements are in line with the study's aims. This strong support shows that digital comics could be a very useful and creative way to teach, and that they could really help students understand and learn the concepts presented in the IPAS book. The results show that it is possible to find more interesting and useful ways to teach through digital comic through storytelling (Calik & Seckin-Kapucu, 2021). It is not only possible but also thought to be necessary to include digital comics and storytelling in IPAS lessons for fifth-grade elementary school students. This will make lessons more engaging and helpful. This study shows that adding digital comics to schools could have a significant impact on providing students additional methods to learn and understand science in the IPAS Book.

The average response rate from teachers on the questionnaire was 91.818%, which is a little higher than the response rate from students. This suggests that digital comics with visual story elements meet the study's objectives. This means that teachers see these tools as useful resources for achieving educational goals, which may go beyond the study's initial objectives. This fits with what teachers consider, which makes the case for using digital comics with visual storytelling elements as a useful teaching tool that can help both students and teachers (Rahiem, 2021)

3. CONCLUSION

The study demonstrates the potential of digital comics as a valuable teaching tool, benefiting both students and teachers. The study discovered that both students and teachers exhibited favorable reactions to the incorporation of digital comics into fifth-grade IPAS lessons. The interactive nature of digital comics, which utilize visual storytelling, is in line with the objectives of the study and offers an innovative approach for improving the overall educational experience. it highlights the potential of digital comics in creating a stimulating and efficient educational environment for students, supporting eachers in their teaching activities.

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