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Development and Usability of Interactive Comics to Raise Animal Welfare Awareness among Agricultural Students

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ABSTRACT

Animal welfare education plays an important role in helping students understand the needs and rights of animals. Although the subject of Agriculture provides a unique opportunity to engage students in animal-based learning, understanding animal welfare is often overlooked. This study aims to i. Identify the need for interactive comics to increase animal welfare awareness among Agriculture students at Sekolah Menengah Kebangsaan Kampong Chengal, ii. Develop interactive comics to increase animal welfare awareness among Agriculture students at Sekolah Menengah Kebangsaan Kampong Chengal and iii. Determine the applicability of interactive comics to increase animal welfare awareness among Agriculture students at Sekolah Menengah Kebangsaan Kampong Chengal. The study design used was the development of comics using the DDR model and a quantitative survey method. The study instrument was a Likert scale questionnaire. A total of 3 expert evaluators were appointed to make the validity of the questionnaire. A pilot study evaluation among students was also carried out by evaluating 10 Form 4 students in the Agriculture subject. A total of 38 Form 4 Agriculture students at SMK Kampong Chengal were involved as the population and 36 people as the actual study sample. The data received was analyzed from SPSS will be analyzed descriptively using mean, standard deviation and percentage to obtain responses and feedback regarding the usability of the module during the PdP session in the classroom. The results findings of the real study showed that the development of animal welfare comics should be developed by obtaining good respond from respondents through the main objective questions in the questionnaire, namely part B: Development of Interactive Comics for Animal Welfare has obtained a mean value = 4.4586 and standard deviation, $\sigma = 0.43452$ for the validity of the usability of the comics from experts and students while for other main parts of the study such as part C: Usability of Interactive Comics for Animal Welfare has obtained a mean value = 4.4605 and standard deviation, $\sigma = 0.39833$. While for part D: Overall Satisfaction with Interactive Comics for Animal Welfare has obtained a mean value = 4.3342 and standard deviation, $\sigma = 0.36412$. This shows that the mean value and standard deviation for each main objective have been at a high level. Overall, the implementation of this study can provide implications for Form 4 Agriculture students at SMK Kampong Chengal to increase awareness of animal

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welfare through a more effective interactive and practical approach for the Agriculture subject.

1. Introduction

1.1 Background of the Study

Incorporating animal welfare education into the secondary school curriculum is essential to fostering empathy and responsible behavior among students. Integrating such educational programs can significantly influence students' attitudes toward animals and their welfare, ultimately shaping a more compassionate future generation. Animal welfare education plays a vital role in helping students understand the needs and rights of animals.

By educating students about responsibility towards animals, they will better understand the importance of caring for and protecting animals as sentient beings. For example, humane education programs conducted in schools have been shown to increase students' positive attitudes towards animals and increase their empathy for living beings (Nguyen, 2019). Therefore, education that emphasizes responsibility towards animals can help students understand the importance of caring for and protecting animals as sentient beings (Hübner & Krebber, 2023).

The use of comic media in teaching has been proven to increase students' motivation to learn [4]. In a study by Badeo and Koc [3], it was found that students showed increased positive attitudes towards learning when they were involved with teaching materials in the form of comics. This positive attitude is important because it influences their desire to learn and interact with learning materials. Comics can encourage active student involvement in the learning process. By using comics as teaching materials, students not only learn passively but also engage in activities such as group discussions or related projects. This is in line with the results of a study by Handayani *et al.*, [9] which showed that the use of comics can improve students' critical and verbal thinking skills. With this, the knowledge gained through comic media becomes deeper and more meaningful.

The use of interactive comics in the education of secondary school students has become a topic of research that is gaining increasing attention. Interactive comics, which combine visual and text elements with interactivity, offer an interesting and effective learning approach for students. According to a study by Mikamahuly *et al.*, [13], the use of comics as a learning medium can increase students' interest in learning because they are straightforward, easy to understand, and able to bring learning materials to life through visual creativity.

1.2 Problem Statement

In the context of education, animal welfare is still under-recognized, especially at the secondary school level. Although the subject of Agriculture provides a unique opportunity to engage students in learning about animals, especially issues and challenges during animal husbandry, understanding animal welfare is often neglected. Studies conducted in Malaysia show that students still do not understand the basic concepts of animal welfare [17]. A study conducted in 2019 by the Kuala Lumpur Veterinary Services Department found that the residents of Putrajaya, including students, do not have a high awareness of animal welfare (Aziz, 2021). It was identified that the causes of this situation include lack of knowledge, how to evaluate pets, perceptions, culture, economics, and communication. This weakness may stem from the lack of effective educational approaches to convey moral values and empathy towards animals.

Lack of knowledge about animal welfare among Malaysian students has been identified as a major cause of animal cruelty. According to a report by the Veterinary Services Department (JPV) (2021), low levels of awareness have led to widespread animal cruelty, including neglect and physical abuse.

Indifference and lack of empathy towards animals also stems from a lack of exposure to education that emphasizes moral and social values related to animal welfare. A study by Shah Jahan Assanarkutty (2015) emphasizes that education about wildlife and ethics towards it is important in efforts to sustainably conserve wildlife.

Therefore, this study identified that the lack of innovative educational tools plays a major role in the inability to increase awareness and positive attitudes towards animal welfare among students. A study by Damayanti and Kuswanto [5] showed that comic-based learning has a positive impact on students' verbal and critical thinking skills, with a significant impact on improving critical thinking skills. In this case, it increases student activity and participation in discussions, positive responses and interest in the learning process and increases student understanding. Therefore, there is a need for interesting, relevant, and effective learning materials to convey the concept of animal welfare. Therefore, approaches such as the use of interactive comics can be a holistic solution.

Existing formal education has failed to effectively address animal welfare issues, especially among secondary school students. The lack of relevant and innovative learning materials contributes to the knowledge gap and indifference towards animal welfare. Therefore, this research aims to develop and evaluate the usability of interactive comics as a learning tool to increase students' awareness, attitudes and behaviour regarding animal welfare with the hope of changing the younger generation to be more concerned about animal welfare.

2. Literature Review

21st century learning refers to an educational approach that emphasizes skills such as creativity, critical thinking, communication and collaboration. These skills are considered essential to address the challenges of the modern world (Thornhill-Miller et al., 2023). In this context, technology plays a significant role with the use of digital tools such as online learning platforms, interactive applications and social media as teaching and learning mediums. In addition, this approach emphasizes student-centered learning. This means that students are encouraged to participate in their own learning process and work together to improve themselves.

Teaching aids (TAs) are an important part of the educational process and help teachers convey knowledge more effectively. TAs include various types of materials and tools that can be used to enhance students' understanding and interest in the subject being taught. Examples include charts, three-dimensional models, multimedia equipment such as projectors, and digital materials such as videos or learning applications [14]. The use of these aids aims to enhance students' understanding of the subject being taught and maintain their interest throughout the learning process.

Interactive comics have great potential in improving learning effectiveness at the secondary school level. Interactive comics offer a more engaging learning experience because they combine visual, narrative, and interactivity elements, which are in line with the interests of adolescent students [11]. Interactive click-and-explore comics offer a more in-depth and enjoyable learning approach in secondary schools. Click-and-explore elements allow students to actively explore content by choosing story paths or additional information, which makes learning more personal and meaningful [7]. A study by Abdul Rahman and Siti Aishah [1] found that the use of interactive comics increased student motivation and improved their achievement in science subjects.

3. Methodology

3.1 DDR (Design, Development and Research)

3.1.1 Design phase

To determine the design of the interactive comic Animal Welfare, a closed online needs analysis was conducted using a questionnaire to identify the needs and characteristics of elements such as comic features, comic content, design and cover display for the development of this interactive comic (Table 1 and Table 2). Needs analysis in comic book development is where the process is carried out on several questions and issues to identify problems and how to solve them. According to Said and Abd Gani (2015), the analysis process aims to ensure that the teaching design that will be produced meets and meets the needs of students. Issues and problems can be identified by conducting questionnaires, interviews, surveys, observations and so on.

Table 1
 Demographic information of respondents for needs analysis

	Frequency (N)	Percent (%)
Gender		
Men	17	68
Woman	8	32
Job		
Student	24	96
Teacher	1	4
Age		
15-17	24	96
40-60	1	4

Table 2

Analysis of development needs and usability of interactive comics to increase animal welfare awareness among form 4 agriculture students

	Mean	Standard Deviation
Comic features		
Visual Elements	3.92	.954
Medium size	4.20	.957
Contains activities/quizzes	4.08	1.12
Easy to use teachers	4.04	.889
A clear educational element	4.44	.961
Friendly and accessible design	4.36	.860
Use of appropriate language	4.40	.866
Contents		
Animal rights and the importance of protection	4.32	.852
Examples of animal abuse	3.88	1.054
How to help and care	4.28	.891
Stories about rescued animals	4.24	.926
Interactive - text, visual and graphics	4.24	.926
Abandoned animal statistics and facts	4.00	.913
Front page design and display		
Attractive front page display	4.12	.927

Animal Welfare Theme	4.20	.866
Easy to read font	4.52	.872
Use of Arial writing	3.96	.889
The text size is differentiated	4.28	.980
Text size for titles increased	4.36	.907
Attractive front page design	4.32	.900
Clear title display	4.20	.913
Uncompact front page	4.12	.971
<u>Does this Interactive Animal Welfare Comic need to be developed?</u>	Frequency	Percent
Yes	24	96.0
No	1	4.0

Development Phase

The development of this learning module will also be done through the use of Canva Pro software through Figure 1. To ensure that teachers can improve student understanding during learning in the classroom, the use of additional graphic materials in the module such as attractive visual elements, bright and soft colors and clear illustrations will be placed so that students better understand how to convey the story and can raise awareness about animal welfare, namely being someone responsible for animal welfare at home or at school. Through the interactive comic module montage, students can apply the creation of effective illustrations to obtain interesting information.



Fig. 1. Developing a comic cover using Canva Pro

Evaluation Phase

In the third phase, the process of validating the prototype model will be carried out using the survey research method. A questionnaire instrument will be developed. Before that, a pilot study was carried out to ensure the validity and reliability of each item in the questionnaire. Through the pilot study, the researcher obtained a total of 11 respondents consisting of 10 students and one teacher from SMK Kampong Chengal to answer the study questionnaire. The pilot study questionnaire was administered online using a closed questionnaire method. The period for obtaining pilot study data was 2 weeks, from 6 to 19 April. After the pilot study data was completed, the researcher conducted data analysis using SPSS to obtain the Cronbach alpha value for each section. The researcher has placed each pilot study finding in chapter 4 for detailed viewing.

3.2 Population and Sample

This study involves teachers and students at SMK Kampong Chengal to determine the needs of the elements and usability of interactive comics. The number of Form 4 Agriculture students at SMK Kampong Chengal is 38, according to the table, Table 3.2 Krejcie and Morgan, this study will be conducted randomly to 36 students and a teacher of the Form 4 Agriculture class at SMK Kg Chengal using a quantitative approach. Teachers and students will be given several sets of questions to answer using a google form link.

3.3 Research Instrument

In the pilot and actual study instrument that was made by the researcher, there are 5 sections, namely section A: Demographics, section B: Development of Interactive Animal Welfare Comics, section C: Usability of Interactive Animal Welfare Comics and section D: Overall Satisfaction with Interactive Animal Welfare Comics. The questions in this study instrument were built based on the objective that was made by the researcher, namely to develop an interactive animal welfare comic to be evaluated by students and teachers.

3.4 Data analysis methods

To ensure that the study will be conducted smoothly, the data collection procedure must be followed carefully. This process begins by obtaining confirmation from experts and ensuring the reliability of the instruments used after the questionnaire is prepared and approved by the supervisor. Then, the questionnaire is distributed to the study sample and the researcher provides a clear explanation to the respondents. This explanation aims to ensure that the information collected can be understood clearly and accurately by the study population. Proper data collection procedures play an important role in ensuring the success of quantitative research conducted by the researcher. The researcher collected data using the google form platform by sending the google form link to SMK Kampong Chengal. Data collection was carried out from March to April 2025 at SMK Kampong Chengal.

The data obtained from the responses in the questionnaire was analyzed and reviewed using the Statistical Package for the Social Sciences software, better known as SPSS 22. This software is used by most researchers because its arrangements are very systematic and user-friendly, making it easier to analyze the study data.

In this study, mean score interpretation analysis was used to see the level of need for the interactive comic module on animal welfare. There are three levels of mean averages that are interpreted and categorized in the score measurement. According to Khalip Musa and Hariza Abd. Halim [12], a mean score from 1.00 to 2.33 refers to a low mean value, a score from 2.34 to 3.66 is a moderate mean value, and a mean score from 3.67 to 5.00 represents a high mean value level. Table 3 is a table of mean score interpretation data analysis used in this study:

Table 3
Mean score value indicator

Mean score value	Interpretation
1.00 – 2.33	Low
2.34 – 3.66	Moderate
3.67 – 5.00	High

4. Analysis and Discussion

4.1 Pilot Study

Through the pilot study of comics, the researcher obtained the research findings needed before conducting the actual study by conducting a Cronbach Alpha reliability analysis. The findings of this pilot study are described using the Cronbach Alpha value. This is because the reliability coefficient value must be greater than 0.7 to be accepted in the study and indicates that the items in the question are reliable. According to Kılıç, S. (2016) if the Cronbach alpha coefficient is equal to or higher than 0.70, the psychometric test is considered reliable. The demographics of the respondents studied are based on gender, age and occupation. Therefore, the Cronbach Alpha test was conducted to see if the survey questions measured through the Likert scale were reliable through the aspects of the characteristics, content, design and display of the comic cover.

SPSS was used to obtain the Cronbach Alpha value. If there is a value of less than 0.7, it is possible that the items constructed do not measure what they are supposed to measure. A review of the item questions should be done to overcome the low value. There is also the possibility that the number of items is too small can also be considered as a contributing factor. The demographic data for this study consists of students, Agriculture subject teachers and Malay Language subject teachers in the Kota Bharu District, Kelantan involving a daily secondary school, namely SMK Kampung Chengal. A total of 11 selected respondents answered the questionnaire set that was constructed. According to a study by Andrade, C. (2020), a small sample size can be used randomly for a pilot study if statistical assumptions cannot be made or initial data is not yet available. This is considered appropriate in terms of ethics and practicality. This section aims to obtain personal information from respondents in terms of gender, age and occupation. Figures 4.1 to 4.3 display the background of the study respondents.

Demographic Data

The demographic data for this study consists of students and teachers of the Agriculture subject in Kota Bharu District, Kelantan involving a daily secondary school, namely SMK Kampung Chengal. A total of 11 selected respondents answered the questionnaire set that was built. This section aims to obtain personal information from the respondents in terms of gender, age and race. Tables 4 to 6 display the background of the study respondents.

Table 4
Profile of study respondents by gender

Gender	Total (people)	Percent (%)
Men	4	(36.4%)
Female	7	(63.6%)

Table 5

Profile of study respondents based on age range

Age Rate	Total (people)	Percent (%)
15-17	9	(72.7%)
35-40	1	(9.1%)
40-60	1	(9.1%)

Table 6

Profile of study respondents based on type of occupation

Type of Job	Total (people)	Percent (%)
Student	9	(81.8%)
Teacher	2	(18.2%)

4.2 Data Reliability Test

The questions in part B ask about the development that needs to be done in comics. In this part B, the respondents consist of 9 students and 2 teachers at SMK Kampung Chengal. Table 7 shows the descriptive data for the questions in part B answered by teachers and students at SMK Kampung Chengal. The overall induction set, the Cronbach Alpha value results show that all items B1, B2, B3, B4, B5, B6, B7 and B8 are at a high level. The Cronbach Alpha value results for these 8 items are all at a Cronbach Alpha value = 4.4586. In other words, the findings of this study show that most of the respondents stated that they agreed with the recommendations from the researchers about the development that needs to be done in comics based on knowledge, attitudes and practices related to animal welfare. Therefore, this data shows that the development of comics based on knowledge, attitudes and practices related to animal welfare has good criteria for developing comics based on knowledge, attitudes and practices related to animal welfare.

Table 7

Part B

Value of Cronbach's Alpha

Reliability Statistics	
Cronbach's Alpha	N of Items
.762	8

The questions in section C ask about usability which shows that comics are suitable for use in the classroom. In this section C, the respondents consist of 9 students and 2 teachers at SMK Kampung Chengal. Table 8 shows the descriptive data for the questions in section C answered by teachers and students at SMK Kampung Chengal. The overall induction set, the Cronbach Alpha value results show that all items B1, B2, B3, B4, B5, B6, B7, B8, B9 and B10 are at a high level, namely the Cronbach Alpha value = 0.933. In other words, the findings of this study show that most of the respondents stated that they agreed with the suggestions from the researchers about the usability of comics that can be used for learning related to the subtopic of current issues and challenges in animal husbandry. Therefore, this data shows that the usability of comics can help increase animal welfare awareness among Form 4 Agriculture students at SMK Kampung Chengal.

Table 8
Part C
Value of Cronbach's Alpha
Reliability Statistics

Cronbach's Alpha	N of Items
.933	10

The questions in section D asked about the satisfaction of students and teachers with the interactive animal welfare comics to find out the overall achievement level of the comics according to their views. In this section D, the respondents consisted of 9 students and 2 teachers at SMK Kampung Chengal. Table 9 shows the descriptive data for the questions in section D answered by teachers and students at SMK Kampung Chengal. The overall induction set, the Cronbach Alpha value results showed that all items B1, B2, B3, B4, B5, B6, B7, B8, B9 and B10 were at a high level of 0.855. In other words, the findings of this study show that most of the respondents stated that they agreed with the suggestions from the researchers about the overall satisfaction found in the comics that can be used for learning for various parties who want to know about animal welfare. Therefore, this data shows that overall satisfaction with the comics can help increase animal welfare awareness for various parties, not only among Form 4 Agriculture students at SMK Kampung Chengal because the use of these comics is also suitable for various groups of society.

Table 9
Part D
Value of Cronbach's Alpha
Reliability Statistics

Cronbach's Alpha	N of Items
.855	10

4.3 Expert Validity

Part B Questions: Development of Animal Welfare Interactive Comics

The questions in section B asked about the development that comics need. In this section B, the respondents consisted of 36 students and 2 teachers at SMK Kampung Chengal. Table 10 shows the descriptive data for the questions in section B answered by teachers and students at SMK Kampung Chengal. The overall induction set, the mean results showed that all items B1, B2, B3, B4, B5, B6 and B7 were at a high level.

The overall mean of questions in section B is mean = 4.4586 and the overall standard deviation is 0.43452. In other words, the findings of this study show that most of the respondents stated that they agreed with the recommendations from the researchers about the development that needs to be in comics based on knowledge, attitudes and practices related to animal welfare. Therefore, this data shows that the development of comics based on knowledge, attitudes and practices related to animal welfare has good criteria for developing comics based on knowledge, attitudes and practices related to animal welfare.

Table 10
 Development of interactive comics on animal welfare

	N	Minimum	Maximum	Mean	Standard Deviation
Is the design of the interactive animal welfare comic developed suitable for learning about issues and challenges in animal husbandry?	38	4	5	4.37	0.489
Is the design and layout of the developed interactive animal welfare comic attractive and easy to use?	38	4	5	4.45	0.504
Is the design of the developed interactive animal welfare comic neat and solid?	38	3	5	4.45	0.555
Is the size of the interactive animal welfare comic developed appropriate (medium size and easy to carry)?	38	4	5	4.55	0.504
Is the design of the interactive animal welfare comic developed appropriate for students?	38	4	5	4.53	0.506
Interactive animal welfare comics developed to be easy for students to understand	38	4	5	4.45	0.504
Is the content of interactive animal welfare comics suitable for use in different contexts (home, school, etc.)?	38	4	5	4.42	0.500
Total Amount	38	3.86	5.00	4.4586	0.43452
Valid N (listwise)	38				

Part C Questions: Usability of Animal Welfare Interactive Comics

The questions in section C ask about usability which shows that this comic is suitable for use in the classroom. In this section C, the respondents consist of 36 students and 2 teachers at SMK Kampung Chengal. Table 11 shows the descriptive data for the questions in section C answered by teachers and students at SMK Kampung Chengal. The overall induction set, the mean results show that all items B1, B2, B3, B4, B5, B6, B7, B8, B9 and B10 are at a high level. The overall mean of the questions in section C is mean = 4.4605 and the overall standard deviation is 0.39833. In other words, the findings of this study show that most of the respondents stated that they agreed with the suggestions from the researchers about the usability found in the comics to be used for learning related to the subtopic of current issues and challenges in animal husbandry. Therefore, this data shows that the usability of comics can help increase animal welfare awareness among Form 4 Agriculture students at SMK Kampung Chengal.

Table 11
 Usability of animal welfare interactive comics

	N	Minimum	Maximum	Mean	Standard Deviation
Achieving learning objectives	38	4	5	4.42	.500
Facilitate teaching and learning	38	4	5	4.45	.504
Do the interactive animal welfare comics you developed work well?	38	4	5	4.47	.506
Is the usability of the developed interactive animal welfare comics at a high level?	38	4	5	4.50	.507
The use of interactive animal welfare comics that were developed can be linked to teaching issues and challenges during farming, which will help students apply animal welfare practices when practicing quail farming.	38	4	5	4.53	.506
The use of interactive animal welfare comics developed is a fun and easy way to introduce and illustrate animal welfare.	38	4	5	4.42	.500
The use of interactive animal welfare comics developed is very important to foster students' curiosity.	38	4	5	4.47	.506
The use of interactive animal welfare comics developed is very important to increase student engagement in teaching and learning activities in the classroom.	38	4	5	4.50	.507
The use of the interactive animal welfare comics developed is very important to increase students' understanding of animal welfare practices.	38	3	5	4.39	.547
The use of the interactive animal welfare comics developed is very important for students because animal welfare can be applied during practical activities of quail farming and caring for the welfare of animals around them.	38	4	5	4.45	.504
Total Amount	38	4.00	5.00	4.4605	.39833
Valid N (listwise)	38				

Question Part D: Overall Satisfaction with Animal Welfare Interactive Comics

The questions in section D asked about the satisfaction of students and teachers with the interactive animal welfare comics to find out the overall achievement level of the comics according to their views. In this section D, the respondents consisted of 36 students and 2 teachers at SMK Kampung Chengal. Table 12 shows the descriptive data for the questions in section D answered by teachers and students at SMK Kampung Chengal. The overall induction set, the mean results showed that all items B1, B2, B3, B4, B5, B6, B7, B8, B9 and B10 were at a high level. The overall mean of the questions in section D was min = 4.3342 and the overall standard deviation was 0.36412. In other words, the findings of this study showed that most of the respondents stated that they agreed with the suggestions from the researchers about the overall satisfaction found in the comics that can be used for learning by various parties who want to know about animal welfare. Therefore, this data shows that overall satisfaction with the comics can help increase awareness of animal welfare for various parties, not only among Form 4 Agriculture students at SMK Kampung Chengal because the use of these comics is also suitable for various groups of society.

Table 12
 Overall satisfaction with animal welfare interactive comics

	N	Minimum	Maximum	Mean	Standard Deviation
The goal of interactive comics is animal welfare.	38	4	5	4.37	0.489
The content of the interactive animal welfare comic is easy to understand.	38	4	5	4.39	0.495
The content of this interactive comic on animal welfare contains all the basic information that students need to know.	38	4	5	4.32	0.471
The content is easy to convey to students.	38	4	5	4.24	0.431
This interactive animal welfare comic can increase students' understanding of animal welfare.	38	4	5	4.26	0.446
This interactive comic on animal welfare has the potential to be a reference source for teachers.	38	3	5	4.26	0.554
This interactive animal welfare comic is easy to use.	38	4	5	4.37	0.489
This animal welfare interactive comic is of high quality.	38	4	5	4.32	0.471
I would recommend this interactive animal welfare comic to other teachers.	38	4	5	4.37	0.489

I would recommend interactive animal welfare comics to the Ministry of Education, Malaysia.	38	4	5	4.45	0.504
Total Amount	38	4.00	5.00	4.3342	0.36412
Valid N (listwise)	38				

4.4 Discussion

Through the discussion of the findings, the researcher was able to connect the relationship between the first main objective, which is to identify the need for interactive comics to increase animal welfare awareness among students of Agriculture at SMK Kampong Chengal, with the study findings where there are statements from 8 questions in part B, the pilot study and the actual study asking about the development that needs to be in comics. In part B, the pilot study obtained a high Cronbach Alpha value of 0.762. Respondents consisting of 9 students and 2 teachers at SMK Kampong Chengal gave the highest percentage of strongly agreeing with the statement that the design and layout of the interactive animal welfare comics that were developed were interesting and convenient for them. This is because it can help improve students' understanding and attract their interest in the subject being taught by using digital interactive elements. Charts, three-dimensional models, multimedia equipment such as projectors, and digital materials such as videos or learning applications are examples [14]. Meanwhile, for part B of the actual study, which consisted of 36 student respondents and 2 teachers at SMK Kampong Chengal, the highest percentage strongly agreed with the statement that they strongly agreed that the size of the interactive animal welfare comic developed was appropriate (medium-sized and easy to carry). This is evidenced by the highest mean value = 4.55 and standard deviation = 0.504. This is because the use of textbook size is less suitable for the needs of today's students who are increasingly exposed to the latest technology in education. A study by Choi and Kim (2021) found that interactive comics can motivate students to learn, especially for students who do not like traditional teaching methods. At the same time, the first research question regarding the need for interactive comics to increase animal welfare awareness among SMK Kampong Chengal Agriculture students can be answered through the connection of the first objective with the discussion of the study findings which show that many teachers and students strongly agree with the statements in section B, the pilot study and the actual study questioning the development that comics need to have.

In addition, the second objective is to develop interactive comics to increase animal welfare awareness among SMK Kampong Chengal Agriculture students with the results of the study where there are statements from 10 questions in section C, the pilot study and the actual study asking about the overall satisfaction of the interactive animal welfare comics. In section C, the pilot study has obtained a high Cronbach Alpha value of 0.855. Respondents consisting of 9 students and 2 teachers at SMK Kampong Chengal gave the highest percentage of strongly agreeing with the statement that this interactive animal welfare comic can increase students' understanding of animal welfare. The integration of interactive elements in comics can help students' understanding in learning that includes interactive quizzes such as Quizziz to make students active. According to a study by Tan and Lee (2021), it was found that this approach increases students' memory because it actively involves them in interactive learning. Meanwhile, for part C of the actual study, which consisted of 36 student respondents and 2 teachers at SMK Kampong Chengal, the highest percentage strongly agreed with the statement that strongly agreed with the statement that the use of interactive animal welfare comics developed can be linked to teaching issues and challenges during farming will help students

apply animal welfare practices during quail farming. This is evidenced by the highest mean value = 4.53 and standard deviation = 0.506. This is because the use of visuals to explain animal welfare practices can provide a clear picture to students in increasing their level of awareness. According to Mayer (2020), comics have visual elements that help students reduce cognitive load and facilitate data processing and recall. In fact, the second research question regarding the characteristics of the elements that must be present in developing interactive comics to increase animal welfare awareness among SMK Kampong Chengal Agriculture students can be answered through the connection of the second objective with the discussion of the study findings which show that many teachers and students strongly agree with the statements in part C, the pilot study and the actual study that questions the overall satisfaction of the interactive animal welfare comics.

Next, the third objective, which is to determine the usability of interactive comics to increase animal welfare awareness among students of SMK Kampong Chengal Agriculture based on the views of experts and students, can be linked to the findings of the expert validity study where there are statements from the questions in part B, questioning the validity of interactive animal welfare comics. In part B, the expert validity study has obtained appropriate views in terms of the usefulness of comics, ease of use of comics, ease of learning comics, satisfaction with comics as well as suggestions and improvements to comics. The respondents consist of 3 experts who are lecturers and experienced teachers in the fields of Language, Education and the field. According to the experts, all the items stated for each part B are suitable for use in producing interactive animal welfare comics. Meanwhile, in terms of suggestions and additions to comics, the first expert stated that the comics provided can be improved by using simple sentences to read. Therefore, the researcher has made improvements according to the suggestions to ensure that the sentence construction used in interactive comics is easy to understand to increase animal welfare awareness among Agriculture students. This is because students need to understand the sentences used in the comic narration to illustrate the animal welfare concept that is to be conveyed. Interactive comics are able to attract students' attention through a combination of visual elements and storylines that help them understand difficult concepts more easily (Landherr, 2019). At the same time, the third research question regarding the views of experts and students on the usability of interactive comics to increase animal welfare awareness among Agriculture students at SMK Kampong Chengal can be answered through the connection of the third objective with the discussion of the study findings which show that there are views of experts who agree with the statements in section B regarding all items being appropriate and suggestions for improvement have also been given to ensure that interactive animal welfare comics can be used to increase animal welfare awareness among Agriculture students at SMK Kampong Chengal.

5. Conclusion

Based on the study conducted by the researcher, there are several suggestions that can be used as further studies in the future. Among the further studies that can be done is implementing an interactive comic on animal welfare that includes all the issues and challenges of animal husbandry found in the Form 4 Agriculture subject.

Apart from that, this study can also be continued to see the effectiveness of comics developed in schools that have Agriculture as a subject. With a systematic study in testing the effectiveness of this comic, the ability of this comic to raise awareness of animal welfare can also be improved and proven more clearly.

Next, in terms of comic design, the researcher thinks to make comics as application design. Applications that make it easier for teachers and students to download via playstore or app store.

Since in this day and age, gadgets such as mobile phones have become a necessity in society's daily life. By making learning comics as applications, teachers and students only need to click on the application that has been downloaded without having to search again for the comic that needs to be accessed. In addition, reduce the size of the e-comic file so that it can be easily accessed by students who are in remote areas.

The development and usability of Interactive Animal Welfare Comics for the Agriculture subject is a study that can benefit teachers and students. Through this study, all three objectives have been successfully achieved through the production of comics for the agriculture subject. The study findings obtained from the validity analysis of the comics also show positive results. There are several things that require action from the researcher, namely improving any criticism that has been given by the expert panel. This needs to be implemented so that the comics that have been built can be used and their usability level can be increased.

However, the applicability of a learning strategy, especially instilling awareness of animal welfare through the use of Interactive Animal Welfare Comics, is entirely dependent on the teacher who conducts the learning. This is because the ABM used only acts as an assistant in implementing PdPc, but the teacher also plays an important role in the learning process.

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