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Development of Interactive Multimedia Using Android-based Ispring Suite and Integrated Webquiz Kahoot for Temperature and Heat Material

Rosana Yulia, Endang Surahman*, and Nana
Physics Education, Universitas Siliwangi, Tasikmalaya, Indonesia
*e.surahman@unsil.ac.id

Abstract

Research on the development of interactive multimedia using Android-based Ispring Suite and integrating Webquiz Kahoot on temperature and heat material, which aims to analyze the level of validity and practicality of the developed multimedia. The research was conducted using the R&D method through a 4-D model (Define, Design, Development, and Disseminate). However, this research is limited to the development stage because it is focused on knowing the level of validity and practicality of the product. The definition stage includes front-end analysis, analysis of student needs, and formulation indicators of competence attainment. The design stage includes making an outline, a flowchart, and a storyboard, choosing a supporting platform, and selecting the type of writing. The development stage includes making products, conducting validation tests by material and media expert validators, and conducting practical tests involving XI IPA 1 and XI IPA 3 classes as research subjects and high school physics educators. The results showed that the validation results for material experts and media experts were 0,94 and 0,92 in the very valid category, while the average percentage of practicality was 97,5% in the very practical category. The developed interactive multimedia can be used in the learning process on temperature and heat material for class XI IPA, and it is hoped that using this multimedia can improve student learning outcomes.

Keywords: Ispring suite; Interactive multimedia; Temperature and heat; Webquiz Kahoot

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INTRODUCTION

Since 2019, the era of Society 5.0 has been initiated by the Land of the Rising Sun, Japan. The Japanese government states that this era is synonymous with humans harnessing various innovations by utilizing technology to enhance the quality of life. In this era, technology is rapidly advancing. For example, in 2019, the number of Android smartphone users in Indonesia reached 370.1 million (Al Faruqi, 2019; Usmaedi, 2021).

In facing the Society 5.0 era, the 3M skills (writing, reading, and arithmetic) are not only provided to students but also need to be equipped with 21st-century skills. Therefore, the education sector must adapt to the digitization of the current era (Hanafy, 2014; Hartini et al., 2017; Rahayu, 2021). Educators are required to have digital literacy, enabling them to leverage technological advancements in learning activities. One of these advancements includes developing multimedia learning applications to provide a quality learning experience. The presence of such applications makes the learning process flexible. Technology integration has transformed traditional education into application-based learning media synchronously and asynchronously (Sugito et al., 2019; Sulistyo & Kurniawan, 2020; Yumnah, 2021).

Based on a preliminary study at one of the high schools, it can be concluded that this year's teaching and learning activities are conducted face-to-face, using traditional methods such as chalkboards and lecture-based teaching with the assistance of textbooks. Meanwhile, assignments are collected through exercise books or single sheets of paper collected directly at school. This differs from the previous two years when remote learning was conducted, and the learning medium used was a chat application. In this application, educators only conveyed text/photo-based material and assignment instructions. Such a learning environment made students quickly feel bored, reduced their motivation to learn, and limited interaction to a one-way flow from the educator. This occurred due to a lack of variety in learning media and the absence of interactive multimedia with abstract physics content, such as temperature and heat.

Thus, physics is considered difficult and unpopular among most students. Even the abstract concepts of temperature and heat lead to misconceptions among students. Previous research also indicates that misconceptions about temperature and heat are frequently experienced by many students (Alfiani, 2015; Alfisyahrina, 2015; Wulandari, 2018). These misconceptions hinder students from understanding the concepts conveyed by educators, thereby impeding the acquisition of new knowledge. Furthermore, the impact of misconceptions is that students will have a different understanding than the educators, resulting in incorrect answers when they attempt questions. Consequently, students' daily assessment scores decrease. This is evident from the lowest daily assessment scores in the physics subject of temperature and heat, with an average score of 53.43. Meanwhile, 153 students have not achieved a score above the minimum passing grade for physics, 76. Based on these daily assessment results, it can be concluded that the subject of temperature and heat is still considered difficult, as the assessment scores are low. Temperature and heat have a Basic Competency of 3.5, according to Permendikbud No. 37 Year 2018. Therefore, innovative interactive multimedia is required to visualize the concepts of temperature and heat. Based on previous research, interactive multimedia can address misconceptions, enhance concept comprehension, and increase students' engagement in the learning process (Febriana, 2017; Suniati et al., 2013; Zukhruf et al., 2016).

Interactive multimedia is a collection of various media elements combined into one container, including text, images, videos, animations, audio, and tools that facilitate user actions on the multimedia, allowing it to respond according to the user's actions. This interaction creates a dynamic relationship between users and the multimedia. Interactive multimedia also enables the visualization of the learning material, making it more concrete and enhancing the understanding of concepts for students (Leow et al., 2014; Syawaludin et al., 2019; Zainuddin et al., 2019). Furthermore, implementing interactive multimedia in education can optimize the time spent during teaching and learning activities, as educators no longer need to write extensively on the chalkboard, leading to increased student motivation (Asyhar, 2012; Raharjo & Kuswadi, 2016).

The primary platform for creating interactive multimedia is Microsoft PowerPoint, which can be combined with iSpring Suite. The combination of PowerPoint and iSpring Suite enhances presentation slides, making them interactive with features such as navigation buttons through hyperlinks, simulations, quizzes, internet videos, and more. Since the quiz exercises in iSpring Suite can sometimes lead to navigation errors, Kahoot can be used as an alternative. Kahoot is a website and application that presents quizzes in a "game-show" format. After the quiz, participants will know their scores based on ranking (Bunyamin et al., 2020; Iwamoto et al., 2017).

Based on the previous presentation, the authors aim to provide an alternative solution by developing interactive multimedia using iSpring Suite based on Android and integrating it with the web-based Kahoot quiz. This multimedia is expected to be an alternative idea for educators to develop learning media, making the learning process effective and efficient and improving students' learning outcomes.

METHOD

The Research and Development (R&D) method was chosen to conduct this study. The R&D method is used to produce learning media and test its effectiveness (Sugiyono, 2019). The research development model used in this study is the 4-D model (Thiagarajan et al., 1974). This model was selected because it provides detailed but simple and easy-to-follow stages for research development. The stages of the 4-D development model include Define, Design, Development, and Disseminate. Since this research focused on testing the validity and practicality of the product, the research implementation was limited to the development stage. Based on the chosen development model, the research procedure is outlined as follows:

Define

The Define stage involved front-end analysis needs analysis for students and formulating competence achievement indicators. Front-end analysis aims to identify issues in physics learning, leading to the need for a learning medium (Thiagarajan et al., 1974; Mi'rojiah, 2016). Front-end analysis was conducted by interviewing physics educators and observing one of the Tasikmalaya State High Schools. The needs analysis for students was based on data from student needs questionnaires. These questionnaires were used to analyze the multimedia learning needed by students. Subsequently, the researchers could determine the physics material to be incorporated into the interactive multimedia. The material selection was based on the lowest daily assessment scores obtained from the front-end analysis and student needs, enabling the researchers to formulate competence achievement indicators in accordance with the core competencies (KI) and basic competencies (KD) referring to Permendikbud Number 37 of 2018, if the school being researched follows the 2013 curriculum. Meanwhile, if the chosen school used the independent curriculum, the researchers created learning achievements according to the Head of BSKAP's Decision Number 008/KR/2022 regarding Learning Achievements.

Design

The design stage was the second step in designing and determining the form of the developed learning media tool (Mi'rojiah, 2016; Thiagarajan et al., 1974). The procedures carried out in the design stage include (1) instructional design (outline); (2) creating a flowchart; (3) creating a storyboard; (4) selecting the supporting platform for interactive multimedia creation; (5) selecting the typeface for interactive multimedia creation.

Develop

The development stage included several activities, namely (1) product creation, (2) product validation testing, and (3) product practicality testing. Product validation testing was conducted using a validation questionnaire filled out by validators. This questionnaire contained several statements and response categories referring to the Likert scale. Thus, the response categories have score criteria, as indicated in Table 1.

Error! Reference source not found. Media assessment criteria

Score	Criteria
5	Excellent
4	Good
3	Fair
2	Poor
1	Very Poor

After obtaining the data from the validation questionnaire is then calculated using Aiken's formula (Aiken, 1985). The validation score can be categorized based on Table 1.

Table 1 Product validity categories

Value Range	Category
0,81 – 1	Very Valid
0,61 – 0,8	Valid
0,41 – 0,6	Fairly Valid
0,21 – 0,4	Less Valid
0 – 0,2	Very Less Valid

(Riduwan, 2010)

In addition, all suggestions, comments, and the results of the validation test analysis were used as guidelines to improve the product. Product testing was also carried out with research subjects, namely Class XI IPA 1 and XI IPA 3. This testing aims to obtain the effectiveness and practicality level of the interactive multimedia based on data derived from responses from students and educators through questionnaires. The questionnaire consisted of several questions and response categories referring to the Likert scale. Thus, the response categories have score criteria, as indicated in **Error! Reference source not found.**. After obtaining the data from the responses of students and educators, the researchers analyzed the questionnaire using the Riduwan & Akdon (2015) formula. Once the product's practicality score was obtained, it can be interpreted based on Table 2.

Table 2 Product practicality categories

Value Range (%)	Category
81 – 100	Very Practical
61 – 80	Practical
41 – 60	Fairly Practical
21 – 40	Less Practical
0 – 20	Very Less Practical

(Arikunto, 2010)

Table 1 and Table 2 show that the product is considered valid and practical if the calculated validity value is greater than or equal to 0.61 and the practicality value is greater than or equal to 61 percent.

RESULTS AND DISCUSSION

Define

Front-End Analysis

Based on the front-end analysis, it can be determined that the learning activities fall under a teacher-centered approach with textbooks as the teaching material. However, technology has not been fully utilized. The teachers also mentioned that the topic of temperature and heat had the lowest daily assessment score in the academic year 2022/2023, which was 53.43. Overall, students in class XI

IPA have Android smartphones, and the school provides free Wi-Fi.

Student Needs Analysis

The analysis of student needs indicates that 83.38% of the 32 students mentioned that the physics textbook does not enhance their enthusiasm for learning because it lacks images and physics material videos and seems monotonous. Therefore, 90.63% of the 32 students are interested in a physics subject application, and 93.75% of the 32 students require an interactive multimedia integrated with Webquiz Kahoot that is engaging and can be used on Android smartphones.

Formulating Competence Achievement Indicators

The topic of temperature and heat was chosen for this research based on the lowest daily assessment score in the subject of physics at one of the state high schools. This research setting still follows the 2013 curriculum, so the temperature and heat material was based on KI and KD 3.5, which involved analyzing the influence of heat and heat transfer, including the thermal characteristics of a material, heat capacity, and heat conductivity in daily life. This refers to Permendikbud Number 37 of 2018. Based on KI and KD, 28 competency achievement points can be formulated and divided into three lessons: temperature, heat, and heat transfer.

Design

Instructional Design (Outline)

Instructional design (outline) is a text intended to provide an overview of the produced product, reduce the possibility of getting stuck during product creation, and help the researchers stay organized in developing multimedia according to the created outline (Herman, 2017; Senjaya, 2019). Based on the results of the define stage, an outline can be designed, including (a) objectives; (b) topics of the learning material, starting from temperature, heat, and heat transfer; (c) components of interactive multimedia to be developed, starting from accessing the application, the developed multimedia's title, the main menu consisting of KD and concept maps, the learning menu, quiz menu, literacy corner, and references, to exiting the interactive multimedia application.

Flowchart Creation

A flowchart is a flow diagram containing specific symbols to illustrate the workflow of the application program. Having a flowchart can make it easier for users to understand the flow of the application program (Indrajani, 2011; Malabay, 2016). This flow begins from the beginning, goes through the content, and reaches the end. The result of creating a flowchart can be presented in Figure 1.

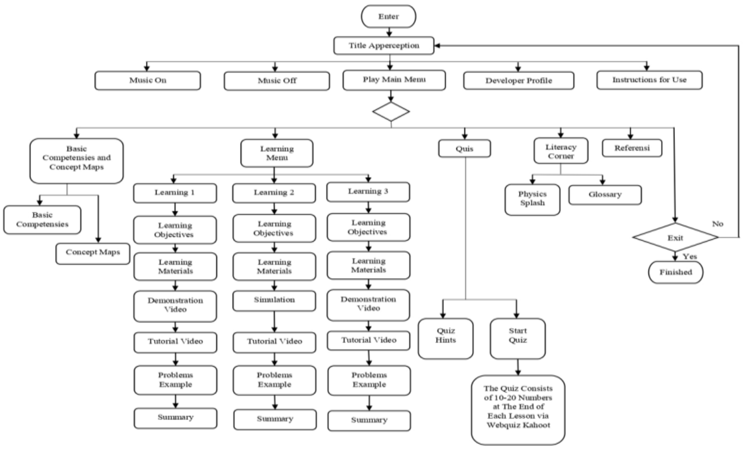
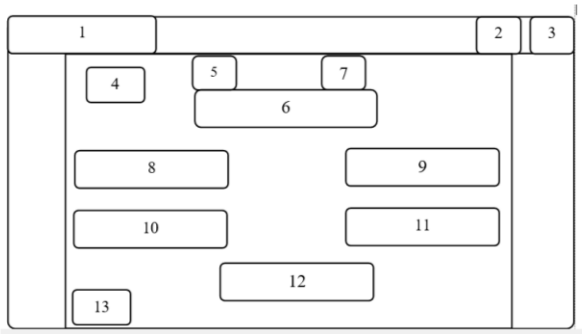


Figure 1 Flowchart of the developed multimedia

Storyboard Creation

A storyboard is a systematically created design using symbols and the previously created flowchart (Dhimas, 2013; Rahardja, 2010). The storyboard was in the form of a rectangular layout containing specific information. This information corresponds to the symbols listed on the storyboard. The benefits of a storyboard include (1) speeding up the product creation process, (2) showing the application program's flow with visual layouts of the screens to be created, (3) aiding in interactive multimedia design (Diartono, 2013; Mahardika, 2014). The storyboard for this research showed several views, including (1) the initial view; (2) menu views such as the Basic Competence and concept map menu, learning menu, literacy corner menu, quiz menu, and reference menu; (3) views that explain each application feature according to the menu; (4) exiting the application view. Samples of the storyboard can be presented in

Figure 2.



Information:

1. Title of Application, “Temperature and Heat”
2. Home Button
3. Ellipsis Symbol
4. Logo of Universitas Siliwangi
5. Blue Cat Animation
6. Frame title, “Main Menu
7. Orange Cat Animation
8. Basic Competence and Concept Map Button
9. Learning Menu Button
10. Literacy Corner Button
11. Quiz Menu Button
12. Reference Button
13. Back Button

Figure 2 One of the storyboards from the developed multimedia

Selection of Supporting Platforms in Interactive Multimedia Creation

The primary platform for this research was Microsoft PowerPoint 2013, integrated with iSpring Suite. Meanwhile, supporting platforms for interactive multimedia creation included Canva, YouTube, Phet Simulations, Google Drive, Google Forms, and Webquiz Kahoot.

Selection of the Font Type in Interactive Multimedia Creation

The selected font types are Constantia, Quicksand, More Sugar, and Sniglet, with font sizes ranging from 24 to 28 to explain each interactive multimedia content. The title is set to a font size of 40. These font types were chosen because they are not excessive, easy to read, and are considered sans-serif fonts. This aligns with Nurseto's (2011) recommendation that, during the development of educational media, simple and clear fonts should be used, avoiding connected and complex fonts that may be difficult for users to read.

Develop

The develop stage is the realization of the previous stages. In broad strokes, this stage involves several activities, including:

Product Creation

The results of product creation included the logo and interactive multimedia application. The logo serves as the application's identity, featuring the title of the interactive multimedia material, "Temperature and Heat," and several illustrative images to represent the content to users or learners. These images included a child helping their mother hang clothes to dry, a thermometer, a train track, and boiling water. The logo's appearance can be seen in Figure 3.

Figure 3 Appearance of the logo

The interactive multimedia application consists of several screens, including the initial screen that contains several navigation buttons, namely the "developer profile," "enable background music," "disable background music," "user guide," and "start" buttons. The initial screen when running this application can be seen in Figure 4.

Figure 4 Initial screen

The application also includes a main menu. This screen will appear on the display if the user presses the "start" button. The main menu contains various options that can be freely selected by the user (learner). These options include basic competencies and concept maps, learning menus, literacy corners, quiz menus, and references. This view can be shown in Figure 5.

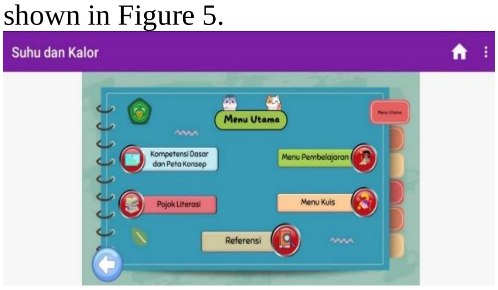


Figure 5 Main menu

The basic competencies and concept map menu contain basic competencies that correspond to the results from the previous stage and concept maps consisting of temperature, heat, and heat transfer concept maps. Overall, the learning menu includes lessons 1, 2, and 3. Lessons 1 and 3 include objectives, content, demonstration videos, learning material videos, sample questions, and summaries. Lesson 2 also contains menu items similar to lessons one and three, but no demonstration video exists. Instead, it offers a simulation of experiments through the PhET simulation website. The literacy corner menu includes a physics spark page that explains the application of temperature and heat and a glossary. Meanwhile, the quiz menu includes quiz instructions and a "start quiz" navigation button that will take the user to the Web quiz Kahoot interface, allowing the user to take the quiz as directed on the quiz instructions page. One of the learning materials and quiz views can be seen in Figure 6 and Figure 7.

Figure 6 One of the learning material screens

Figure 7 One of the Questions in Webquiz Kahoot

Validity Test

Results of Expert Material Validation

In this research, there were three expert material validators, namely validator 1, a physics education lecturer; validator 2, a physics education lecturer; and validator 3, a physics subject educator. Expert validation was carried out by filling out a questionnaire covering learning and content aspects. The questionnaire contained a total of 18 indicators. The summary data of the material expert validation results can be seen in Table 3.

Table 3 Results of expert material validation

No Indicator	Validator 1	Validator 2	Validator 3	*V*
Aspect of Learning				
1	5	5	5	1.00
2	4	5	5	0.92
3	5	5	5	1.00
4	4	4	5	0.83
5	5	4	5	0.92
Aspect of Content				
6	5	4	5	0.92
7	4	5	5	0.92
8	5	4	4	0.83
9	5	4	5	0.92
10	5	5	5	1.00
11	4	5	4	0.83
12	5	5	5	1.00
13	5	5	5	1.00
14	5	5	5	1.00
15	5	5	5	1.00
16	4	4	5	0.83

No Indicator	Validator 1	2	3	V
17	5	5	5	1.00
18	4	5	5	0.92

Based on Table 3, the averages for each aspect and overall can be categorized as very valid according to Table 1. The product can be categorized as very valid, with a validity score of 0.93 for the average of learning aspects, 0.94 for the average of content aspects, and 0.94 for the overall average. This indicates that the product produced aligns with the suitability of learning and content aspects.

Results of Expert Media Validation

There were three expert media validators in this research, namely validator 1, who is a physics education lecturer; validator 2, a physics education lecturer; and validator 3, a physics subject educator. The expert media validation was conducted by filling out a questionnaire covering appearance and design aspects. The questionnaire contained a total of 15 indicators. The summarized data of the expert media validation results can be seen in Table 4.

Table 4 Results of expert madia validation

No Indicator	Validator 1	2	3	V
Aspect of Appearance				
1	5	5	5	1.00
2	4	4	4	0.75
3	5	4	5	0.92
4	5	5	5	1.00
5	5	5	5	1.00
6	5	5	5	1.00
7	4	4	5	0.83
8	4	3	5	0.75
9	5	4	5	0.92
10	5	4	5	0.92
11	5	4	5	0.92
12	5	4	5	0.92
13	5	5	5	1.00
14	5	5	5	1.00
15	4	5	5	0.92
			Average	0.92

Based on Table 4, the average result of expert media validation in this research is 0.92, so the product can be categorized as very valid and suitable regarding appearance aspects. This classification refers to Table 1.

The validation questionnaire also included a column for notes or suggestions from each validator, allowing them to provide feedback that the researchers can use to improve the product. One of the notes or suggestions a validator gave is regarding the learning objectives, where the background and text should have more contrasting differences or sharpened color contrast and text. As a result, the researcher changed the background template color from aqua blue with a darker 25% composition to aqua blue with a darker 10% composition. Meanwhile, the text color, originally black, was changed to white when placed directly on the background template. The appearance of the learning objectives before and after the improvement can be seen in Figure 8 andFigure 9.

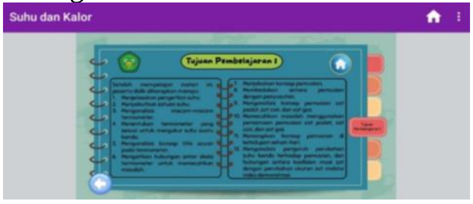


Figure 8 Learning objectives display before improvement

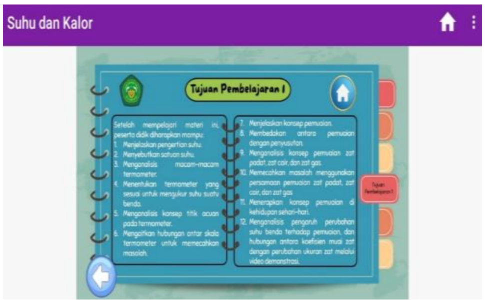


Figure 9 Learning objectives display after improvement

Practicality Test

The interactive multimedia product was implemented through field practicality testing to determine the practicality level of the produced product. This field practicality testing was conducted with research subjects. The testing took place on March 28-29, 2023, by demonstrating the product to the students during physics learning activities. After the learning session, the students provided feedback through questionnaires designed to measure the product's practicality. The questionnaires, completed by students and educators, consisted of 18 indicators related to using interactive multimedia in the learning process. The summary of the results of the students' usability testing can be found in Table 6.

Table 5 Data on student practicality assessment results

No.	Total Score	Average Score	P
1.	306	4.71	94%
2.	305	4.69	94%
3.	310	4.77	95%
4.	311	4.78	96%
5.	311	4.78	96%
6.	312	4.80	96%
7.	308	4.74	95%
8.	307	4.72	94%
9.	311	4.78	96%
10.	305	4.69	94%
11.	304	4.68	94%
12.	311	4.78	96%
13.	310	4.77	95%
14.	313	4.82	96%
15.	307	4.72	94%
16.	310	4.77	95%
17.	308	4.74	95%
18.	305	4.69	94%
Total	5.554	85.45	

Based on Table 5, the usability score for each indicator falls within the "very practical" category, with percentages ranging from 94% to 96%. This categorization is interpreted according to Table 2. After obtaining the usability scores for each indicator, the average usability rating for students is calculated using equation (3), resulting in an average percentage of 95%, categorized as "very practical."

Similarly, the data on educator usability assessment can be processed to determine the usability score using equations (2) and (3), and the results are interpreted based on Table 2. The data from the educator's usability assessment can be found in Table 6.

Table 6 Data on teacher practicality assessment results

No.	Total Score	Average Score	P
1.	5	5	100%
2.	5	5	100%
3.	5	5	100%
4.	5	5	100%
5.	5	5	100%
6.	5	5	100%
7.	5	5	100%
8.	5	5	100%
9.	5	5	100%
10.	5	5	100%
11.	5	5	100%
12.	5	5	100%
13.	5	5	100%
14.	5	5	100%
15.	5	5	100%
16.	5	5	100%
17.	5	5	100%
18.	5	5	100%

Based on Table 6, the practicality score for each indicator can be categorized as "very practical" within a percentage range of 100%. This categorization is interpreted based on Table 2. After obtaining the practicality scores for each indicator, the average practicality rating for educators can be calculated using equation (3), resulting in an average percentage of 100%, categorized as "very practical."

After obtaining the average percentages from the usability testing for students and educators, the overall usability percentage is 97.5%, which can be categorized as "very practical." Based on the usability testing results, it can be concluded that the interactive multimedia product is highly practical and suitable for use in the learning process.

In this research, the product's validity and practicality level can be determined based on the results of validation and usability testing. Validation was conducted by content experts and media experts on the developed product, resulting in average validation scores of 0.94 and 0.92. This indicates that the interactive multimedia developed meets the "very valid" criteria, referring to Table 1. Therefore, the developed product is considered highly valid and suitable for testing with research subjects, including 11th-grade students in the Science program and physics educators. The usability testing analysis on interactive multimedia conducted with students shows an average percentage of 95%. Meanwhile, the average percentage from the analysis of usability testing data by educators is 100%. The overall average percentage of usability testing results is 97.5%. These results conclude that interactive multimedia is highly practical and suitable for learning, based on Table 1.

Based on the research, it can be determined that the interactive multimedia product can be categorized as highly valid and practical for use in physics learning. Previous research also mentioned that (1) interactive multimedia provides visualization of the material; (2) it enhances the understanding of the material; (3) using the product can motivate students to learn more effectively (Ariyanti, 2020; Sepyanda, 2018; Yuniasih et al., 2018).

This interactive multimedia application involves Webquiz Kahoot as a supporting platform for conducting quizzes. If students want to achieve a high score and rank first, they must answer the Kahoot quiz quickly and correctly. This motivates students to have a higher level of motivation to learn compared to before. Based on this statement, the interactive multimedia application aligns with the findings of previous research, including (1) students are motivated to become quiz winners and achieve high scores, thus increasing their motivation to learn; (2) the presence of quizzes through Kahoot leads to improved mastery of the material among students; (3) the classroom atmosphere during the learning process becomes enjoyable and not boring; (4) the presence of a time limit for each quiz keeps students focused on answering the questions; (5) Kahoot can be accessed through a website, reducing the memory load on Android smartphones; (6) educators can obtain quiz results without having to manually check answers (Bunyamin et al., 2020; Mustikawati, 2019; Puspaningrum & Sugiarto, 2020; Sulistiyawati et al., 2021).

Interactive multimedia can be considered instructional multimedia if it serves four functions: attention, affective, cognitive, and compensatory (Levie & Lentz, 1982; Sanaky, 2019). This interactive multimedia fulfills these four functions: (1) the attention function is present in every initial display of the learning material, simulation frames, and video demonstration frames. These initial displays include learning apperception in the form of brief questions related to daily habits, ensuring that learners focus on paying attention to the material to be studied; (2) the affective function is present in several images within the interactive multimedia, such as the image of the North Pole ice floating in the physics spark section on water anomalies. This image of the North Pole ice provides enjoyment to users as they marvel at the image and admire the description of the water anomaly material. (3) the cognitive function is present in several images within this multimedia, for instance, the convection image in liquids. This image helps learners remember the material it contains because it illustrates the process of heat transfer via convection in a simple yet accurate manner, accompanied by explanations alongside the image; (4) the compensatory function is present in the instructional animated videos. These animated videos provide explanations to learners both audibly and visually, helping learners organize information in words and store it in their memory.

This research on interactive multimedia can be used as a standard for future research in developing interactive multimedia products. However, the development of this interactive multimedia may not be flawless. The limitations of this research include (1) the resulting interactive multimedia application only covers one subject matter, which is the topic of temperature and heat, with a storage capacity of 230 MB; (2) field trials of the product were conducted only with high school students; (3) the research focused on analyzing the validity and practicality of the product. Nevertheless, although the research was conducted up to the development stage, it resulted in an interactive multimedia application that educators can use during their teaching.

CONCLUSION

Based on the research and development of interactive multimedia using Ispring Suite for Android and integrated with Webquiz Kahoot on temperature and heat, the following conclusions can be drawn: this research has a very valid and practical level. The validity of the product was obtained from the validation results by content and media experts. The validation results by content and media experts yielded validity scores of 0.94 and 0.92, categorized as very valid. The product's practicality was based on the usability testing conducted with students and educators. The usability testing results from 11th-grade science students at high schools resulted in an average percentage of 95%, which is categorized as very practical. The usability testing results from high school educators resulted in an average percentage of 100%, also categorized as very practical. The overall average usability testing result was 97.5%, categorized as very practical.

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