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The Development of Teaching Media Based on Interactive Multimedia towards Economic Courses to Enhance Students' Learning Outcomes at Senior High School

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ABSTRACT

Interactive multimedia assists teachers in bringing the outside world into the classroom. Abstract and unfamiliar ideas become concrete and easy to understand by students, so if financial accounting subjects are delivered using interactive multimedia, abstract financial accounting concepts will be easy to convey. This research aims to produce interactive multimedia that is valid, practical and effective for use in economic learning activities. The research method used is Research and Development with the ADDIE development model which includes: 1) Analysis Phase; 2) Design Stage; 3) Development Stage; 4) Implementation Stage; and 5) Evaluation Stage. This research was carried out at one of the state high schools in Medan City. Product validation is carried out by a validator each for material experts and media experts. The research sample was all class XI students. Research instruments include interview sheets, observation sheets, validation sheets, practicality sheets, and test sheets. The research results show that using interactive multimedia in economic learning activities has proven valid, practical and effective in improving student learning outcomes.

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1. INTRODUCTION

Economics is a subject that is studied at every level of secondary school education, especially high school. Most economic lessons are in the form of theory and some are in the form of calculations. In the material calculation section, training methods are needed or material in the form of theory uses different methods to provide variety and ease in understanding the material, so that it can lead students to master economic concepts and their interrelationships to solve problems in everyday life. The purpose of the economics subject is to equip students with knowledge and understanding of various basic competencies so that they master and are able to apply the correct basic concepts, principles and economics, both for the benefit of continuing their education to tertiary institutions and for going out into society (Suwartini, 2017). However, students often need a long time to be logical in understanding material concepts in studying economics.

Economics subjects can be taught easily and correctly to students if the teacher delivers learning by utilizing creative learning media (Zainiyati, 2017). Learning media will be very effective in

supporting and assisting the learning process of students if it is designed and prepared according to the correct procedures (Arham & Dwiningsih, 2016). The development of learning media that is designed by combining several components according to the procedure will be ableto facilitate students' learning process properly (Fikri et al., 2018). The developed learning media should pay attention to not only the interests of the anchors but also the interests of the media users themselves, which are not only related to the interests and needs of talents but also to the basic abilities of users, such as learning styles (Sanjaya, 2016; Prananda, 2020). Each student has individual differences in intellectual abilities related to student readiness to learn (Turhusna, 2020);(Rodiyana & Puspitasari, 2021). Problems often arise in areas where technology cannot be optimized to enable technology-based media learning (Hadisi, 2015). Because some teachers lack the skills necessary to create effective e-learning media due to issues with programming or display design (Sanaky, 2013).

Based on the results of the initial interview performed by the researcher with one of the teachers, it was determined that since the re-enactment of 100% face-to-face learning, the teaching period which was originally 90 minutes, has been decreased to 60 minutes. There is a lot of information to communicate in class, and the teacher needs to be efficient with the time they have. Frequently, students are left to finish their lessons on their own since class time has expired within the middle of the teacher's explanation.

Teachers are also still dominant using PowerPoint slides. The learning material that is poured into the PowerPoint slides is not too different from the learning material that students have in the textbooks. In other words, the teacher only summarizes the contents of the textbook back into power point slides without enriching the content. As a result, in the end, computer-based learning media such as PowerPoint slides are limited to transferring paper media to digital media in the same view, with relatively low interactivity (Wibawanto, 2017). This makes the teacher the main focus of students in obtaining learning materials even though students are given the freedom to use smartphones and access the internet to find other learning resources. In addition, students are also encouraged to record learning material back into the notebook. The impact is that teacher activity becomes dominant and student participation decreases because they tend to be listeners.

This difficulty was demonstrated subsequent to the researchers conducting an inquiry into the reactions of 29 students towards the instructional materials employed by the teacher. A significant majority of 62.1% of the respondents reported that the PowerPoint presentation failed to capture their interest in the learning process. Conversely, the remaining 37.9% expressed a different viewpoint. According to Miarso (2016), every medium possesses its own advantages and disadvantages, making it impossible to determine a single medium that is best appropriate for accomplishing your learning objectives. Hence, employing multiple media concurrently is more efficacious than relying solely on a single medium for the purpose of learning (Wilkinson et al., 2000). However, the available stimuli for learning are extremely restricted. The integration of several forms of media results in the creation of a multimedia (Nunuk Suryani, 2018). For multimedia media to be effective, it should be enhanced with interactivity and incorporate online examinations. This ensures that all the necessary learning stimuli are provided (Dwi Surjono, 2017). Furthermore, the current Interactive Multimedia-based learning media is distributed in the format of compact discs (CDs). This information is obsolete, as current computer devices no longer include CD-ROM drives.

Interactive multimedia is a learning program, which includes images, text, graphics, video, sound, animation, simulation, and so on, in an integrated and collaborative manner, with the help of computer setup to achieve certain learning objectives, and users can actively interact with the program (Prastowo, 2015). According to Gunawan et al. (2017), Interactive multimedia is multimedia that is equipped with a controller that the user can operate. Media can be used in the learning process because it is very effective in improving student learning outcomes, one of which is interactive multimedia (Yudhi, 2013). Learning multimedia generally makes the process more interesting, interactive, and shortens learning time.

Prior research has demonstrated that interactive multimedia can engage students and enhance their learning outcomes by providing more meaningful learning experiences. For instance, Ismah and Riski (2016) conducted research specifically on the effectiveness of interactive multimedia in mathematics education. Sumardi's (2019) study centres around enhancing student learning outcomes by utilising multimedia-based resources. The study findings indicate a rise in learning outcomes following the utilisation of multimedia-based media. In addition, the research conducted by Septian (2019), Putri and Ardi (2021), and Alfin and Listiadi (2021) is worth mentioning. This research primarily investigates the impact of interactive multimedia on student learning outcomes in the context of multimedia-based media. Interactive multimedia allows users to have direct control, giving pupils the ability to determine the direction of their learning process (Sutopo, 2012; Sutarno, 2013; Sutardi, 2014). As a result, this educational tool will enhance students' self-assurance by eliminating any embarrassment they may feel when making mistakes during their learning process.

From some of the results of the previous research, the improvement of the researcher's research is to focus on developing interactive multimedia-based learning media specifically on taxation material to improve student learning outcomes in a state senior high school in Medan.

2. METHODS

This research was conducted at SMAN 3 Medan City of Pulo Brayan, Kec. West Medan, Medan City, North Sumatra Province. The research sample consisted of 35 students a state senior high school in Medan. The research method in this study is the research and development (R&D) method. The development model adopts the ADDIE development model, which consists of five stages: analyze, design, development, implementation, and evaluation (Branch, 2009).

The research steps for developing ADDIE can be seen as follows:

2.1 Analyze

At the analyze stage, activities carried out by researchers include: a) Analyzing the causes of the need to develop interactive multimedia-based learning media; b) Determine learning objectives; c) Analyzing potential users; d) Analyze the required resources; and e) Determine the learning media product delivery system.

2.2 Design

At the design stage, activities carried out by researchers include: a) Determining the application that will be used to design the research product; b) Preparing draft materials in PDF format; c) Creating a flowchart; and d) Creating a storyboard.

2.3 Development

At the development stage, activities carried out by researchers include: a) Building content; b) Developing supporting media; c) Assessing learning media by expert validators; d) Revise learning media according to expert validator suggestions; e) Conduct teacher/educator trials; and f) Conduct field trials

2.4 Implementation

At the implementation stage, the activities carried out by researchers apply interactive multimedia in the learning process.

2.5 Evaluation

At the evaluation stage, the activities carried out by researchers were to analyze student learning outcomes.

2.6 Data Analysis Technique

The technique of giving a score is done by using a Likert Scale. The score obtained from each validator is calculated using the formula (Sugiyono, 2017) as follows:

$$\bar{x} = \frac{\Sigma x}{N}$$

Description:

$\bar{x}$ = Average Score

Σx = Total Score

N = Number of Questions

Next, calculating the average score from the data that has been obtained, both from experts and users, in this case students and teachers, is converted into a qualitative value (interval data) based on four scales.

3. FINDINGS AND DISCUSSION

The ADDIE model is a research approach for development that places emphasis on evaluation and revision at every level. The attributes of the ADDIE model allow for the progressive enhancement of product development through each step. The explanations for the outcomes of each stage are provided below:

3.1 Analysis

Examining the Reasons for the Need for Interactive Multimedia Development Data was obtained from an interview with one of the economics teachers with the following interview content:

Table 1. Examining the Reasons for the Need for Interactive Multimedia Development

No	Questions	Responses
1	What kind of learning media do you usually use in learning?	I usually only use PowerPoint slides and handbooks.
2	When learning online, what kind of learning media do you use?	During online learning, I only communicated with my students via the chat application on WhatsApp. Usually, I send study materials in the form of PDF documents which only contain text and images.
3	What weaknesses or limitations did you find while using this media?	Incidentally, the PowerPoint slides I use as a teaching medium have never been shared with my students, so my students usually only study independently through their handbooks. Apart from that, I also took the points that I put into the PowerPoint slides from their handbook, which have never contained content other than writing and images.
4	What kind of learning media do you need to support teaching activities?	I think learning media that can teach students independently is one of the media that I really need right now. In addition, there is no certainty regarding learning activities during the transition period of the Covid-19 pandemic.

Based on the results of interviews, researchers determined that economic learning activities in schools still largely use textbooks as the main learning source. When professors use PowerPoint slides to present information, pupils tend to pay less attention to the presentations and more to the teacher. In addition, many students no longer value reading on their own time. This highlights the importance of providing students with access to self-directed, multimedia learning resources.

3.2 Determining Learning Objectives

Data was obtained from the description of competency achievement indicators (GPA) based on core competencies and basic competencies that need to be mastered by class XI students in the 2013

curriculum regarding taxation. Researchers will use the GPA to develop content and materials in interactive multimedia. Researchers describe GPA based on the Syllabus.

3.3 Analyze Required Resources

Data was obtained from observations made by researchers during the learning process with the following observation content:

Table 2. Analyzing Required Resources

No	Questions	Observation	
		Yes	No
1	Students can manage time effectively	√	
2	Students can communicate well	√	
3	Students provide assistance to fellow friends who need it	√	
4	Students are able to build cooperation between friends well	√	
5	Students are able to complete the tasks and responsibilities given	√	
6	Each student already has a smartphone	√	
7	Each student already has a laptop		√
8	Students use smartphones in learning activities in class	√	
9	Students use smartphones to search for additional learning resources in classroom learning activities	√	
10	Students prefer to use books rather than smartphones in classroom learning activities	√	

3.4 Determining the Product Delivery System

Data was obtained from observations made by researchers during the learning process with the following observation content:

Table 3. Determining the Product Delivery System

No	Questions	Observation		Description
		Yes	No	
	Teacher			
1	The teacher arranges learning scenarios according to student development	√		Sometimes teachers show learning videos via PowerPoint slides.
2	The teacher arranges learning scenarios according to the learning material	√		Teachers obtain materials for designing learning materials through textbooks and the internet
3	The Teacher uses laptops in learning activities	√		Teachers already have personal laptops and schools already provide free internet networks.
4	The Teacher uses projectors in learning activities	√		The lack of availability of projectors means teachers have to take turns using them.
5	The Teacher allows students to use smartphones in classroom learning activities	√		Teachers allow students to use smartphones only at certain times, such as when doing practice questions.
	Students			
6	Students watch the learning video well	√		When watching learning videos, students appear more enthusiastic and ask more questions about the learning material
7	Students record the learning material again in their respective notebooks	√		Each student neatly records the learning material in their notebook, both the material they get from the teacher and the material they get from the textbook.

3.5 Determining the delivery system for learning media products

Data was obtained from interviews in the preliminary study. Based on the initial interview results, it was concluded that learning activities had been carried out directly in the classroom or face to face, with the teaching duration reduced from 90 minutes to 60 minutes. So, the researchers decided to deliver interactive multimedia products directly in the classroom (Physical face-to-face).

3.6 Design

Determine the application that will be used to design research products. Researchers design interactive multimedia products with the help of MS PowerPoint software in collaboration with the interconnected iSpring Suite 11 program.

3.7 Preparing draft materials in PDF format

The structure of the material used in interactive multimedia is based on the 2013 curriculum class. Researchers collected this material from various references such as articles, internet websites and printed books. Draft materials are prepared in PDF format.

3.8 Creating flowcharts

Making a flowchart in the form of a flow diagram of the structure of the material or message to be conveyed through interactive multimedia. Flowcharts are designed with the aim of explaining the flow of material and media. Furthermore, the flowchart becomes a guide for designing and compiling programs in interactive multimedia. The flowchart display can be seen below:

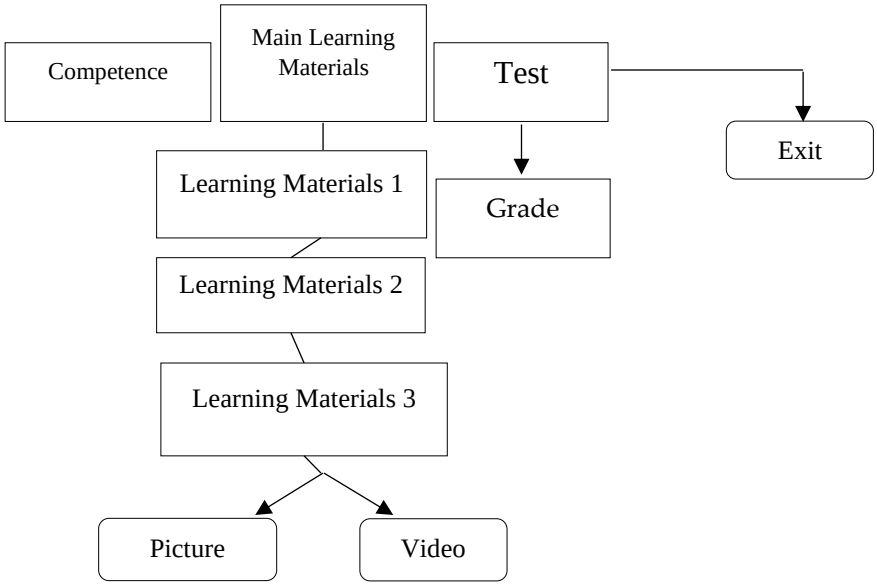
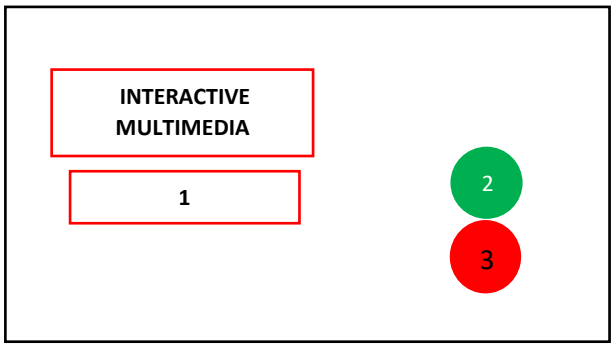
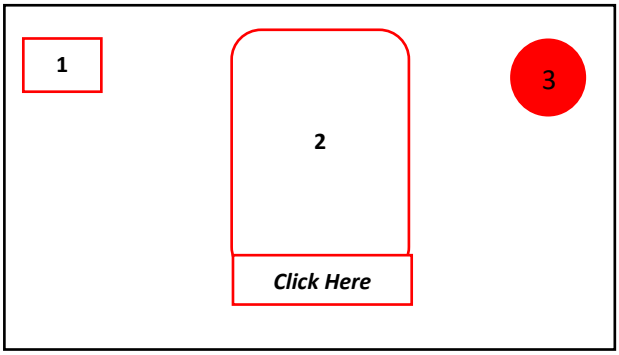
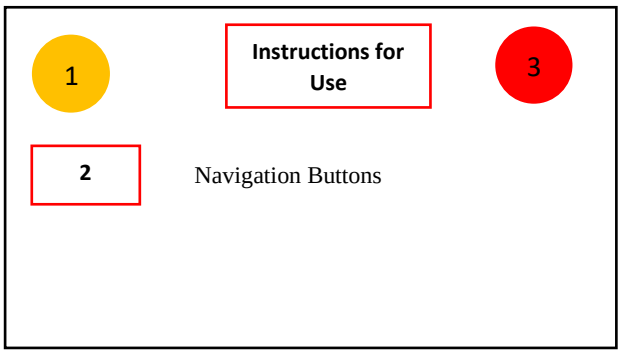
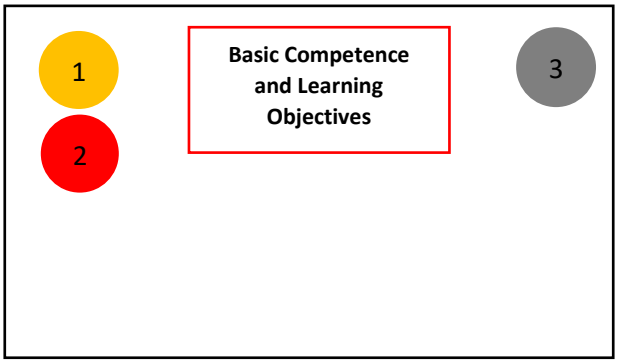


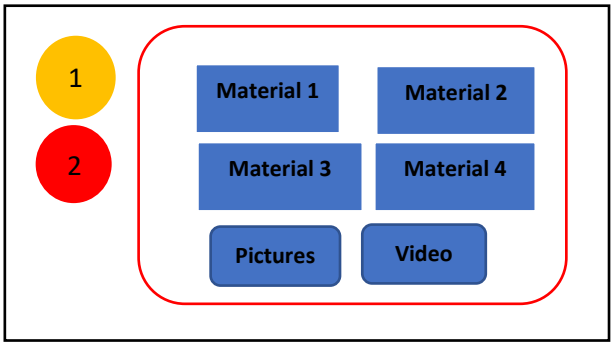
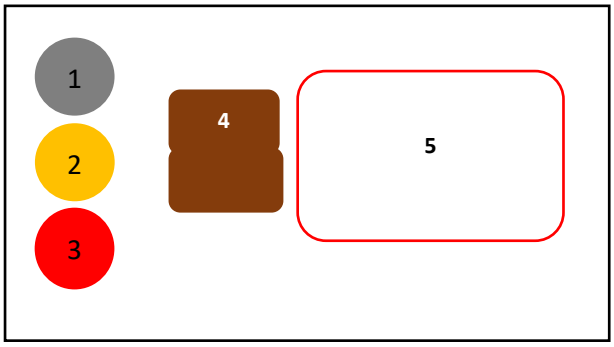
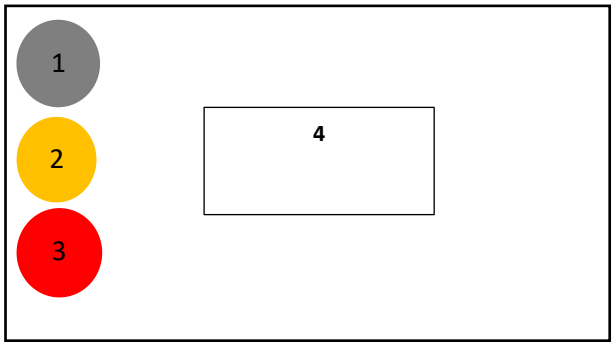
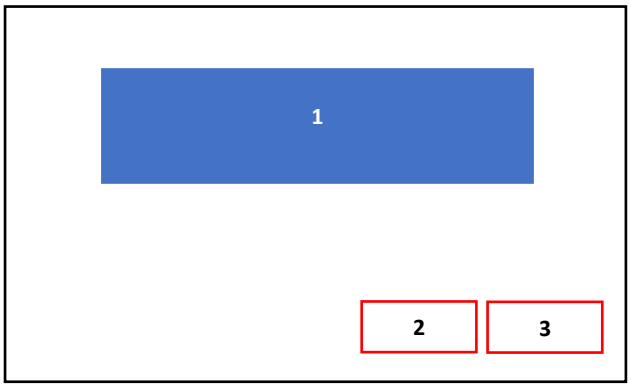
Figure 1. Creating a Flowchart

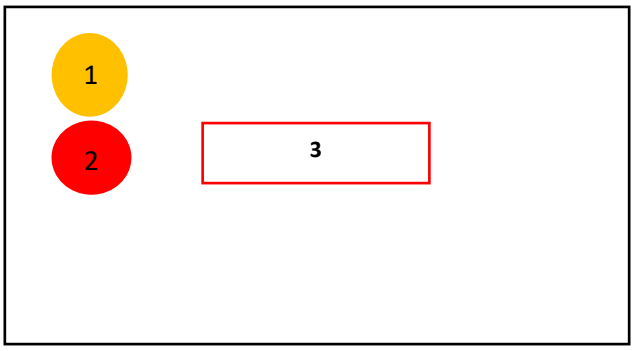
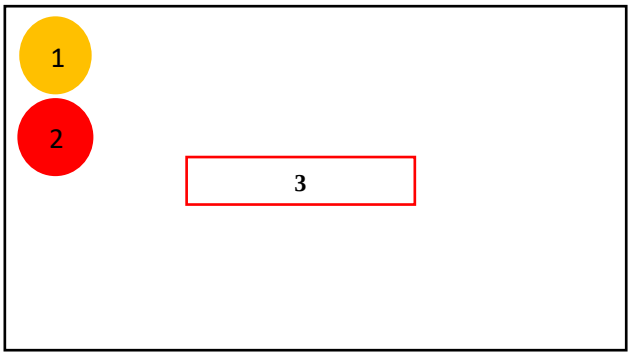
3.9 Creating storyboards

Making a storyboard is done after making a flowchart. Storyboards are made like sketches that use words. Storyboards are designed with the aim of describing the flow of the program from start to finish. The storyboard display can be seen below:

Table 1. Storyboard Table

No	Product Display	Content Description
1		Cover: 1. Title 2. Start button 3. Exit button
2		Main Menu Page: 1. Cover button 2. The Menu is in the form of a rolling slide 3. Start Button
3		User Instructions Page: 1. Home Button 2. Description of Navigation Buttons 3. Exit Button
4		Introduction Page: 1. Home button 2. Exit button 3. Menu button

5		Material Menu Page: 1. Home button 2. Exit button 3. Choice of material
6		Learning Material Page: 1. 1. Menu button 2. 2. Home button 3. 3. Exit button 4. 4. Choice of material 5. 5. Learning materials
7		Video Page: 1. 1. Menu button 2. 2. Home button 3. 3. Exit button 4. 4. Learning videos
8		Practice Questions Page: 1. Quiz title 2. Previous button 3. Next button

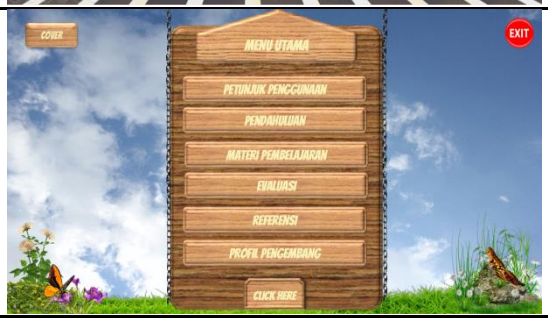
9		Reference Page: 1. Home button 2. Exit button 3. List of references
10		Developer Profile Page: 1. Home button 2. Exit button 3. Developer profile description

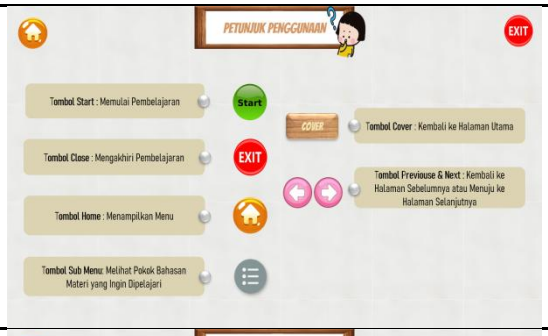
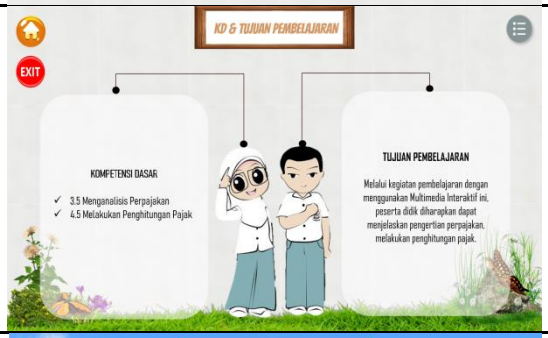
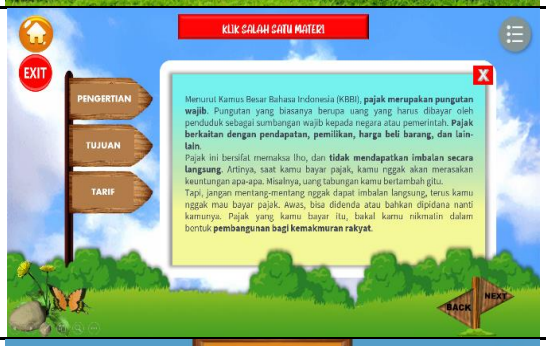
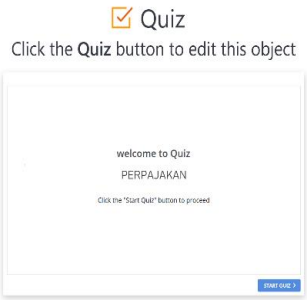
3.10 Development

3.10.1 Building content

Content is an important point to attract students' attention during learning activities. The results of content creation in interactive multimedia can be seen below:

Table 2. Building Content

No	Product Display	Content Description
1		Cover
2		Main Menu Page

3			Instructions for Using Interactive Multimedia
4			Introduction to Interactive Multimedia
5			One Display of Learning Materials
6			**Video View**
7			Display of Learning Practice Questions

8			Development profile view

3.10.2 Developing Supporting Media

Supporting media integrated in interactive multimedia is in the form of online quizzes. Online quizzes are one of the instruments used by researchers to test the effectiveness of research products. The online quiz will be developed with the help of the iSpring suite 11 program. The online quiz consists of 15 multiple-choice questions.

3.10.3 Assessing learning media by expert validators

Expert validation is an assessment carried out by an expert on the learning media being developed. Expert validators consist of two validators each for material experts and media experts. The assessment results can be seen below:

Table 6. Material Expert Validation Results

No	Assessment Aspects	Average Assessment Score for Each Aspect	Category
1	Eligibility of Content	3,89	Very Valid
2	Language	3,57	Very Valid
3	Presentation	4	Very Valid
4	Kegrafikan	4	Very Valid
Total		15,46	
Overall score		3,86	Very Valid

The ranking of interactive multimedia learning media by material experts resulted in an overall average score of 3.86 with a maximum score of 4.00 according to the conversion table for the 'Very Valid' product category. Researchers concluded that material expert verification is suitable for use in the field, but requires correction.

Table 3. Media Expert Validation Results

No	Assessed Score	Average Score	Category
1	Language	3,6	Very Valid
2	Presentation	3,6	Very Valid
3	Media Effects on Learning Strategies	3,4	Very Valid
4	Holistic View Feasibility	3,5	Very Valid
Total		14,1	
Overall Score		3,52	Very Good

The ranking of interactive multimedia learning media by media experts resulted in an overall average score of 3.52 with a maximum score of 4.00 according to the conversion table for the 'Very

Valid' product category. Researchers concluded that media expert verification is suitable for use in the field, but corrections are needed.

3.10.4 Revise learning media according to expert validator suggestions

The learning media that has been designed and assessed is then revised by researchers according to suggestions and input from expert validators in order to get the best results. The suggestions and input that have been given become evaluation material for researchers.

Conducting teacher/educator trials. The assessment results can be seen below:

Table 8. The Assessment Result

Obtained Score (f)	Maximal Score (N)	Final Score (P)	Interpretation
116	130	89.23%	Very Practical

The ranking of interactive multimedia learning media based on teacher/educator trials resulted in a final score of 89.23% with a practicality level of 'Very Practical'. Researchers concluded that teacher/educator verification is suitable for use in the field.

3.10.5 Conducting field trials

The assessment results can be seen below

Table 9. Field Trials

No	Total Score	Average Score
1	63	2,86
2	76	3,45
3	81	3,68
4	68	3,09
5	69	3,14
Total	357	16,2
Overall Score		3,24
Category	Practical	

The ranking of interactive multimedia learning media based on field trials resulted in an overall average score of 3.24, with a maximum score of 4.00 according to the conversion table for the 'Practical' product category.

3.11 Implementation

This stage is the fourth stage carried out by researchers, namely implementing interactive multimedia in the learning process with the following sequence of learning activities:

1. Preliminary Activities The class begins with greetings by the teacher. Teachers take turns attending students. The teacher informs students regarding the competencies and learning objectives that must be achieved at this meeting.
2. 2. Core Activities The teacher asks students to take an online quiz on interactive multimedia on their respective smartphones. The teacher explains tax material on interactive multimedia. The teacher gives students the opportunity to ask questions about the material. Teachers provide opportunities for students to exchange learning information with each other.
3. The teacher provides conclusions regarding the material at this meeting. Teachers collect online quiz scores. The teacher says closing greetings.

3.12 Evaluation

Evaluation is the final stage in development with the aim of assessing the quality of interactive multimedia that has been implemented. At this stage, an analysis of the student learning test results is carried out. Each student completes 15 practice questions with a KKM score of 76. The practice

questions are given to 35 students who have gone through the implementation stage. The assessment results can be seen below:

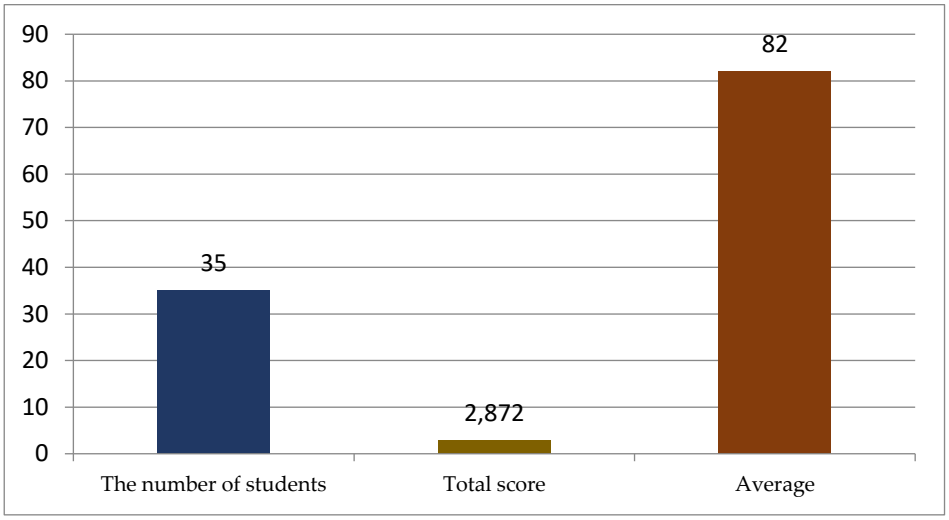


Figure 2. Students' test results

Based on the picture above, it can be seen that there are 6 students who did not reach the KKM score (Minimum Completeness Criteria) and 29 students who achieved the KKM score. With an overall average score of 82.00

Discussion

Students often need a long time to logically grasp the understanding of material concepts in studying taxation. The main cause of difficulties in understanding these concepts is because most of the taxation concepts are abstract in nature, so you need to understand the concept before understanding the formula, but in reality, the learning carried out is more focused on solving problems. Taxation learning activities are also still dominated by textbooks. In the end, students make the teacher the main focus in obtaining learning material. One way that can be done is by developing interactive multimedia.

Interactive multimedia was developed using the ADDIE development model in (Branch, 2009) which consists of five stages: Analysis, Design, Development, Implementation, and Evaluation. The interactive multimedia developed has gone through the validation and product testing stages. From validation activities and product trials, several data were obtained which the researchers then analyzed to find out whether the interactive multimedia being developed was of good quality and met the criteria for validity, practicality and effectiveness. The following is a more detailed explanation of each criterion:

Validity of interactive multimedia-based learning media

Initial interactive multimedia products are first validated by experts. Validation is carried out with the aim of trying to make something valid and trustworthy (Arikunto, 2016). Researchers determine each validator for material experts and media experts. Experts' assessments in determining whether interactive multimedia is appropriate or not are measured based on the aspects that have been described (N. Suryani et al., 2018) including: assessing the appropriateness of linguistic aspects, assessing the appropriateness of presentation aspects, assessing aspects of media effects on learning strategies, and assessing the appropriateness of overall appearance.

Based on the initial assessment of the two material experts for the four aspects above, the validity criterion 'Very Valid' was obtained. Experts advised researchers to re-edit several parts that did not match the experts' concepts. Researchers then made revisions according to suggestions and input from experts to get the best results. The suggestions and input that have been given become evaluation material for researchers.

Practicality of interactive multimedia-based learning media

After the initial interactive multimedia product received the title valid and feasible, the researchers then conducted trials on educators and students before finalizing the final interactive multimedia product which was ready to be implemented. The trial was carried out with the aim of finding out what obstacles educators and students felt during learning using interactive multimedia. The perceived obstacles will be used as evaluation material for researchers to make product improvements. Each student has individual differences in terms of intelligence abilities which are related to the student's level of readiness to learn (Rosyidi, 2017). For this reason, students act directly as assessors in determining whether or not interactive multimedia is suitable for use in their learning activities. Educators also need to provide their assessments, because educators act as users and research partners in developing interactive multimedia.

The results of the trial will be used as a guide to draw conclusions whether the use of interactive multimedia is practical or not. As expressed by (Kunandar, 2014), that the research product is said to be practical if educators and students state that the research product can be applied in learning activities. Assessment is measured based on the aspects that have been described (N. Suryani et al., 2018) including: assessment of material presentation, language assessment, usefulness assessment, and graphic assessment.

Based on the educator's assessment, the practicality criterion was 'Very Practical'. Teachers think that developing interactive multimedia is a good idea to familiarize students with individual learning. Likewise, the practicality criterion 'Practical' is obtained with student assessments. Students like attractive interactive multimedia designs with various color combinations. Interactive multimedia is also provided with instructions for use so that students can easily operate it. Although there are still students who have difficulty loading. This is also what previous experts felt. However, researchers have ensured that users will not be disturbed.

Effectiveness of Interactive Multimedia-based Learning Media to increase the Interest and Learning Outcomes of Class XI Accounting Students

After the final interactive multimedia product is completed and has received the title valid and practical, then the interactive multimedia is ready to be implemented in learning activities. Based on tests on student learning outcomes, it is known that there are 6 students who did not reach the KKM (Minimum Completeness Criteria) score and 29 students who achieved the KKM score. So the researchers concluded that interactive multimedia is valid, practical and effective for use in learning activities to improve student learning outcomes.

4. CONCLUSION

This research and development adheres to the ADDIE paradigm, which entails breaking down the process of producing anything new into several phases: analysis, design, development, implementation, and evaluation. This multimedia activity contains parental advice material. This multimedia experience can be accessed through an Android application. The study's findings suggest that the created interactive multimedia is a viable learning tool for senior high school pupils. The average score was 3.64, categorising students in the band of outstanding achievement. The Interactive Multimedia certification received an average score of 3.86 from subject matter experts. That is why it is a highly auspicious domain for individuals to venture into. Media specialists have rated interactive multimedia material with an average viability score of 3.52, categorising all chances as very good. Researchers have determined that the interactive multimedia-based learning material is valid, practical, and useful in enhancing interest and increasing learning outcomes. They suggest that students studying financial accounting should utilise this material. The enhancement of interactive multimedia-based learning materials has the potential to improve the quality of education across all disciplines.

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