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The Development of Interactive Multimedia Learning in Information and Communication Technology Subjects

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ABSTRACT

Learning media is an important learning component. Therefore, teachers must able to develop instructional media that can improve student abilities. One of the learning media that supports these goals was interactive multimedia. This study aimed to develop valid, practical, and effective interactive multimedia learning on Information and Communication Technology subjects. This research was research and development. The development model used was a 4-D model, which consists of defining, designing, developing, and disseminating stages. The defined stage was carried out with curriculum analysis, material analysis, and student analysis. The design stage was carried out by designing the learning media. At the development stage, validity tests were carried out through validation sheets of learning media, practicality tests through media application observation sheets, teacher and student response questionnaires, effectiveness tests obtained from the knowledge competency assessment. The disseminated stage was carried out by spreading the device. The analysis results showed that the Interactive learning media in Information and Communication Technology subjects have been tested and got a valid score (89.25%), according to the teacher's response (90.23%) in very practical category, students' response (90.09%). The response was in the very practical category. With this score, interactive multimedia is categorized as practical and effective learning media.

1. Introduction

The use of learning media is an inseparable part and is an integration of the learning methods used. With learning media, abstract teaching materials can be concretized and make an unattractive learning atmosphere more interesting, Arisman, 2016; Muyaroah & Fajartia, 2017; Seruni et al., 2019). Some of the existing learning media are a means of conveying information well received and interesting by students. The right media selection affects the achievement of learning objectives (Amkas et al., 2017; Zainiyati, 2017). Using technological media such as computers helps students learn, such as learning to count, read, and enrich knowledge. Therefore teachers are required to be able to develop attractive and communicative learning media for students.

Learning media as a delivery system in the teaching and learning process is optimal based on a certain approach (Fanny & Suardiman, 2013; Harjono et al., 2015). The development of learning media can be used as a foundation to change the situation into a creative, innovative, and more active learning situation for students. It can improve the quality of the learning process. The teacher's quality of the learning process is also influenced because it is an important factor influencing student learning outcomes. It is also in line to develop KTSP, which involves the teacher's activity and creativity as a facilitator and an active and creative motivator. It includes reducing lecture methods, modifying and enriching learning methods, and developing learning situations to work according to their abilities and seek student involvement in various learning activities (Kurniasih & Sani, 2014; Mulyasa, 2014). Information and Communication Technology is a practical lesson. Sometimes the delivery of material finds some obstacles caused by teachers' limitations, equipment, materials, costs, and so on (Arisman, 2016; Fanny & Suardiman, 2013). The process of delivering material is not only delivered verbally. However, it requires additional information such as media to convey students' learning material to be understood.

The results of observations and interviews of researchers on January 19th 2016 in Information and Communication Technology subject teachers at SMA Negeri 2 Lintau Buo revealed several problems in learning Information and Communication Technology due to limited facilities in learning activities such

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as limitations in computer availability, the lack of skills and knowledge of teachers about media. It is causing teachers to be less active in developing learning media. Learning Information and Communication Technology use the computer as the main media to carry out the learning process. In learning Information and Communication Technology, students are required to be active and master the previous material they have learned because the material presented in information and communication technology learning is interconnected and complementary between one material and another.

Based on the observations made at SMA Negeri 2 Lintau Buo, learning materials to understand the functions and work processes of various Information and Communication Technology equipment are usually taught using textbooks and student worksheets, and power points. So far, the learning process's tendency has focused on students' ability to memorize only, but they do not understand the material's substance, connecting what is learned with real life, and use the knowledge gained to support their life. Learning to understand the functions and processes of various Information and Communication Technology equipment cannot be carried out only once. However, students need to repeat it so that the subject matter can be mastered. Understanding the functions and work processes of various Information and Communication Technology equipment contains hard computer knowledge material. Students are also required to be proficient in assembling a computer (Pravitasari & Yulianto, 2018; Sinica, 2013). But in reality, students have limited time to learn and understand the subject matter to make students less active in the learning process at school.

The low student learning outcomes in basic competencies in understanding the functions and work processes of various Information and Communication Technology equipment are thought to be caused because the subject matter is difficult. Students need a long time to understand the material both theoretically and practically. Not all students can complete the required competencies, resulting in student scores below the KKM. The low student learning outcomes in Information and Communication Technology subjects can be seen in Table 1.

Table 1. Student Learning Outcomes in Information and Communication Technology Subjects for the tenth grade of the 2015-2016 academic year

No	Score	Category	Total	Percentage (%)
1.	< 75	Not complete	19	71 %
2.	≥75	Complete	8	29 %
Total			**27**	**100 %**

Based on the data in Table 1, it can be seen that the learning outcomes obtained by students are still not optimal. There were 19 students (71%) who still had scores below the KKM, and only eight students (29%) achieved scores above the KKM. It indicates that the learning process is still not optimal, causing student success in learning is still low. Based on the problems stated above, it is necessary to make a better effort to improve student learning abilities in competency standards in understanding the functions and work processes of various Information and Communication Technology equipment.

The solution to the problem above can be found with the Development of Interactive Multimedia Learning Media in Information and Communication Technology Subjects. Learning that has been provided only with practical books and student worksheets tends to make students feel bored quickly. Student scores are low. The development of interactive media that combines audio and images and is added with videos is expected to overcome student boredom in learning and create an active and creative atmosphere. It also helps teachers convey learning material to students easily, and students can be creative and learn independently. This Interactive Multimedia Learning is described based on one basic competency of the Information and Communication Technology subject. It understands the functions and processes of various Information and Communication Technology equipment which has one of the basic competencies, describing functions, computer work processes, and telecommunications, as well as various Information and Communication Technology equipment (Husein et al., 2017; Lia, 2013; Novitasari, 2016; Pravitasari & Yulianto, 2018; Sinica, 2013). The contents of this interactive multimedia learning media of Information and Communication Technology, starting from the introduction of computer hard media, including the functions and forms of computer hard media, computer work processes, and how to assemble computers. It is hoped that the development of interactive multimedia on Information and Communication Technology can be more effective. Of course, the learning ability of students will increase.

Interactive Multimedia is an interactive learning media. Kertiasih (2010), Interactive Multimedia is a media that emphasizes that a multimedia format can be packaged on a CD (Compact Disk) with the

aim of interactive applications in it (Hakim & Windayana, 2016; Puji et al., 2014). CD is a computer-based multimedia program. This media combines and synergizes all media consisting of text, graphics, photos, video, animation, a numerical, narrative, and interactive which are programmed based on learning theory and packaged on CDs (Harjono et al. , 2015; Istiqlal, 2017).

Interactive Multimedia has advantages; being flexible (can choose the material according to your wishes and use of the time when it will be used), rich content (providing sufficient information according to the material presented) and interactive (two-way communication between the media and users.). It does not only have advantages, Interactive Multimedia also has disadvantages, among others. It will only function for things as programmed, requires multimedia equipment (computers) to access it. Its development requires a professional team, and its development takes quite a long time. This study aims to develop valid, practical, and effective interactive multimedia learning media on Information and Communication Technology subjects.

2. Methods

This research and development used the 4-D Model with the following stages: Define, Design, Develop, and Disseminate. The defined stage includes three main steps, syllabus analysis, concept analysis, and student analysis. The second stage is the design stage. At this stage, ICT learning media design is carried out by analyzing material textbooks and developing detailed programs that include all interactive multimedia components. At this design stage, two stages were carried out, the design of the instruments needed in this study and the instructional media design. The next stage is Develop. At this stage, the validity, practicality, and effectiveness test will be carried out. To test the validity of learning media will be assessed by the validator. The dissemination stage is distributing learning media that meets the valid, practical, and effective requirements. The trial subject was interactive in Information and Communication Technology subjects that would be developed. Simultaneously, the respondents in this study were teachers and students of SMA Negeri 2 Lintau.

3. Result and Discussion

Results

Defining Stage

The definition stage produces an analysis of the syllabus, concepts, and students. The defining stage is the basis for developing instructional media. The component analysis is as follows. The following will explain further the definition stage.

Syllabus analysis

Syllabus analysis was carried out by examining the tenth-grade syllabus of Information and Communication Technology subjects. Based on the Information and Communication Technology syllabus, students know the standard competency and material must be understood. Based on the Information and Communication Technology learning curriculum adjusts to the needs of the industrial world. The industry often tests competence in using computers. Therefore, students must have abilities relevant to the industrial world's needs and master good practice to improve students' abilities.

Material Analysis

The material analysis was carried out by discussing with subject teachers and reviewing textbooks and reference books used by teachers in learning Information and Communication Technology. As a reference for determining and completing the content and learning materials needed in developing interactive multimedia on ICT subjects. In analyzing the material, the researcher arranges the main concepts described in the sub-subjects systematically and links it with other relevant concepts. The material of the Information and Communication Technology subject is Performing basic computer operations, understanding the functions and work processes of various information and communication technology equipment, understanding the provisions for the use of information and communication technology, using a computer's Basic Operating System (OS) and Using word processing software. The purpose of ICT subjects is that students were expected to master the concepts, basic principles, and procedures following the established competency standards and practice according to the material after participating in learning. By watching the video displayed, students find it easier to master the material presented. In addition to basic concepts, examples were also displayed. When starting work, students already know what to do first.

Student analysis

Learning media using interactive multimedia on ICT subjects was designed by analyzing student characteristics. Based on Piaget's theory of cognitive development, high school students in the tenth grade are teenagers. At that age, students can analyze and make their hypotheses on a problem. It means thinking abstractly and understanding the abstract meaning and principles that underlie the concepts, relationships, and theories and formulate hypotheses. By using interactive learning media, students become more enthusiastic, active, creative in learning. Students are actively involved in using video learning media. Students see instructional video media's appearance before practicing, find concepts through observation, apply concepts, and learn independently to practice skills.

Designing Stage

Based on syllabus analysis, material analysis, and student analysis, media design was carried out. At this stage, storyboards and learning media formats have been prepared. Video editing using a video editor application. The video inserted into the Macromedia director consists of an opening display, an opening display containing an intro, and an introduction accompanied by accompanying music. The main menu contains a selection of materials to be presented, videos, and exercises. The contents of the video material following the learning objectives to be achieved and the syllabus. Exercise questions contain questions that will test the students' ability to the material presented in the video.

Development Stage

This stage aims to produce interactive multimedia on Information and Communication Technology subjects that are valid, practical, and effective for the learning process. The validator's assessment of the validation sheet consisted of one FT UNP lecturer, one from STKIP Padang, and two ICT teachers at SMA Negeri 2 Lintau Buo. The results of media validation can be seen in Table 2.

Table 2. Validation Results of Interactive Multimedia Content

Assessment Aspects	Percentage	Category	Validator
Content	88.88	Very Valid	Guru TIK
Interest	90.00	Very Valid	Guru TIK
Average	**89.44**	**Very Valid**	**Validator**

Based on Table 2, validation of media content with an average value of 89.44% can be concluded that the media is in the 81-100 interval with the very valid category. While the design validation is summarized based on the assessed validation category, as shown in Table 3.

Table 3. Validation Results of Interactive Multimedia Design

Assessment Aspects	Percentage	Category	Validator
Media	87.50	Valid	Dosen FT UNP Dosen STKIP
Language	90.00	Very Valid	Dosen FT UNP Dosen STKIP
Average	**88.75**	**Valid**	

Based on Table 3, the design validation with an average value of 88.75% can be concluded that the media is in the 81-100 interval with the very valid category. Interactive multimedia practicality test data on ICT subjects were taken from a questionnaire that has been distributed to teachers and students. Practicality relates to the ease of use of interactive multimedia being developed. Practicality data were obtained through a questionnaire filled in by two teachers, Mr. Oki Noviendra, S.Pd, M.PdT, and Mr. Benni Rikki, S.Kom. From the questionnaire, it can be seen the practicality of the media. The results of the assessment of the practicality of the media were summarized in Table 4.

Table 4. Results of Interactive Multimedia Practicality According to Teacher Response

Assessment Aspects	Percentage			Category
	G1	G2	Rata2	
Ease of Use	90.00	90.00	90.00	Very Practical

Assessment Aspects		Percentage		Category
Time effectiveness	90.00	85.00	87.50	Practical
Media interpretation	86.67	93.33	90.00	Very Practical
Average			**89.38**	**Very Practical**

Based on Table 4, teachers' practicality with an average score of 89.38% can be concluded that the media are in the 81-100 interval with the very practical category. For media practicality, it also requires input in the form of responses from students. This data was obtained after learning through a questionnaire given to students. The results obtained are as shown in Table 5.

Table 5. Results of Interactive Multimedia Practicality from Student Responses

Assessment Aspects	Percentage	Category
Ease of Use of Media	88.97	Very Practical
Time Efficiency	89.18	Very Practical
Media appearance and appeal	92.13	Very Practical
Average	**90.09**	**Very Practical**

Based on Table 5, students' practicality with an average value of 90.09% can be concluded that the media is in the 81-100 interval with the very practical category. Based on the results of the effectiveness test. Student learning outcomes data were taken to see how student learning success in learning does not use interactive media with interactive learning media. To see the comparison of the results score can be seen in the following Table 6.

Table 6. Data Description

Variable	Control Class	Experiment Class
N	25	25
Highest Score	80	92
Lowest Score	64	72
Total	1852	2148
Average	74.08	8592
SD	1.22	1.42
SD2	1.48	2,01

The table above explains that the highest average value of student practice in the control class or class that does not use interactive media gets 80. In the experimental class or class using learning media the highest average score was 92. Meanwhile, the lowest average score in the control class was 64, while the lowest average score in the experimental class was 72. The data showed an increase in learning scores in the control class and the experimental class. Experiment class students understand better with the interactive learning media for Information and Communication Technology subjects.

DISCUSSION

The development of interactive multimedia learning media on Information and Communication Technology subjects based on the needs of SMA Negeri 2 Lintau students. Learning is a combination of human elements, materials, facilities, equipment, and procedures that influence each other to achieve learning objectives. In this Interactive Learning Media, it contains the main material that must be understood by students according to the curriculum and syllabus (Istiqlal, 2017; Sinica, 2013). In the defining stage, the author has made observations with unstructured interviews with tenth grade ICT subject teachers to determine the basic problems faced in learning.

The next step was to analyze the syllabus and literature to determine the material's suitability with the competency standards and basic competencies and analyze students' characteristics. It was known from the teacher concerned that student interest in information technology is quite high. It becomes a support for the development of information technology-based learning media such as interactive multimedia. Interactive Learning Media was developed following the material on ICT subjects taught to tenth-grade students in the first semester and second semester of SMAN 2 Lintau Buo. The development of Interactive Learning Media was carried out with a 4-D development model. Based on the results of the overall validation by 4 validators in aspects of content, interest, media and language on

Interactive Learning Media, it can be seen that Interactive Learning Media has fulfilled the content and interest aspects with 89.44%, media and language aspects with 88.75 %, Both of these aspects, when the score of validity is added up from each validator, the validity score is 89.09%. The score obtained is in the validity level category. According to (Trianto, 2007), it has provided accurate information about the teaching materials being developed.

The practicality test of teaching materials for Interactive Multimedia by teachers and students was carried out through teacher and student response questionnaires showing the practicality test results of Interactive Learning Media by the teacher's response showing practicality a percentage of 89.38% in the very practical category. The practicality test of Interactive Learning Media by student responses was 90.09% in the very practical category. Practical Interactive Learning Media means that it makes it easier for students to understand the hardware material. The pros and cons of learning were supported by users of learning media (Agustina & Sitompul, 2015). Teaching materials in Interactive Learning Media can make a fun learning atmosphere because students are more motivated to complete learning (Shoimin, 2014). Interactive Learning Media's effectiveness was seen from Interactive Learning Media's ability to activate students in learning and make it easier to understand learning material. The use of teaching materials will greatly help the learning process's effectiveness and the delivery of messages. In addition to increasing learning activities, it can also help students improve understanding. In this assessment, the effectiveness of the media was viewed in terms of student learning outcomes.

Two types of tests were carried out to see the effectiveness of Interactive Learning Media, pretest, and posttest. The pretest results were carried out before students do learning using Interactive Learning Media with the number of students who pass the KKM 15 people. In comparison, posttest was carried out after students do learning using Interactive Learning Media with the number of students who passed the KKM 22 people with an effectiveness score of 92.00%. From this study's results, the Interactive Learning Media developed was "Very Effective" to improve student learning outcomes in an affective, psychomotor, and cognitive way. So it can be concluded that this Interactive Learning Media is one of the learning media that is valid, practical, and effective for use in the learning process of Information and Communication Technology subjects in the tenth grade of the first semester and the second semester.

4. Conclusion

Interactive multimedia is suitable for learning in Information and Communication Technology subjects. The audio-visual media displays real motion, sound, and images, making it easier for students to understand the basic concepts of implementing practice in learning activities. Interactive learning media in Information and Communication Technology subjects have been tested and declared valid, practical by the teacher's response in the very practical category. Student responses are categorized as very practical. With this score, interactive multimedia is a practical and effective media used as a learning media.

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