

Mobile-based Thematic Learning Materials with Self-Regulated Learning Models in Wired Area Network Subjects to Grow Student Interest at SMK Malang

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ABSTRACT

Thematic learning is learning while doing something by being able to relate it to everyday life. In some SMKs, in the delivery of material, they still apply the lecture method and the teaching materials used are still in the form of School Work Sheets (LKS) which students find less interesting and tend to be monotonous in their texts, thus making students' interest in learning decrease. Especially in fiber optic material which requires more understanding and practical activities, because this material is quite complicated in its delivery. The aims of this study were 1) to develop mobile thematic learning materials in Broad-Based Network Technology subjects using a self-regulated learning model for students to use in learning outside of learning hours, 2) Test the feasibility of mobile-based thematic learning materials in Network Technology subjects Broad-Based to foster learning interest in class XI TKJ students at SMK Malang, 3) Measuring student interest in implementing mobile-based thematic learning materials with self-regulated learning models in Broad-Based Network Technology subjects. The validation results from material experts and media experts were stated to be very valid with a percentage of 87.5% and 96%. Group testing was stated to be very valid: the test for the small group was 86.90% and the large group was 88.27%. Based on the results of the data that has been calculated, it can be concluded that mobile-based thematic learning materials with self-regulated learning models are appropriate for use in learning Broad-Based Network Technology subjects.

Keywords: *Thematic Teaching Materials, Mobile, Self-Regulated Learning, Learning Interests, Broad-Based Network Technology Subjects.*

1. INTRODUCTION

At present the world has entered the era of the Industrial Revolution 4.0 marked by increasing connectivity, interaction and the development of digital, virtual and artificial intelligence systems [1]. The rapid development of technology greatly affects changes in various fields, one of which is education. Educational institutions are required to be adaptive to any changes in the educational paradigm from traditional teaching to information technology which is the demand of today's global society. The mindset about the role of educators must be changed immediately, not as a transmitter of knowledge, but as a facilitator. If not changed, they will lose their role along with technological developments and changes in learning methods [2]. Therefore, it is

necessary to have readiness and support from the government to continue to be adaptive to changing times, especially in the field of education in the midst of an era of rivalry in technological developments.

The influence of technological developments on education can be seen from changes in the educational curriculum which currently uses the 2013 Curriculum. The 2013 curriculum in its implementation emphasizes student-centered learning processes, but in practice the learning process that takes place is still teacher-centered so that students tend to passive [3]. the concept of the 2013 curriculum is an integrated or thematic curriculum, namely a guideline or system that can integrate Skills, Concepts, Themes, and Topics in the form of Within Single Disciplines, Across Several Disciplines and

Within Across Learners [4]. Therefore, students are expected to be able to relate the material studied to their experiences or daily life.

In response to this, the use of teaching materials is one of the right solutions considering that teaching materials have several functions including being able to save educators' time in teaching, changing the role of educators from being a teacher to a facilitator and increasing the learning process to be effective and interactive [5]. It can be said that teaching materials are learning resources in which there is material that is arranged systematically and used in learning activities to support students so that they can learn well.

The rapid development of technology that exists today, teaching materials that are made interactively and effectively will be able to increase student interest in learning, so that in the learning process students are more motivated [6]. Learning materials are divided into print and non-print. Over time, non-printed teaching materials began to appear, one of which was mobile-based. According to a two-year Global Web Index survey during the pandemic about smartphone ownership, the age range of 16-64 years was 96% [7]. In addition, data from Stats Counter Global 2022 has positioned Android Smartphones in the first position in Indonesia with 96.79% of total smartphone users as of December 2022 [8]. Thus showing that the use of Android smartphones among students has been widely used and participates in marking technological developments and is expected to be a supporting source of learning for students so that they can attract student interest in learning.

Mobile learning-based teaching materials are increasingly interesting to develop, this is due to students' anxiety in reading printed teaching materials issued by the government, namely School Electronic Books (BSE). BSE is considered less attractive in terms of appearance and monotonous tendencies in the text [9]. Mobile-based teaching materials allow students to study anywhere and anytime outside of study hours. In presenting interesting material, basically it must be adjusted and packaged in line with the development of science and technology so that it can attract students' learning interest. In mobile-based teaching materials, it is supported by multimedia features such as audio, video and animation [9]. Thus the selection of mobile learning in this study is suitable for fostering student learning interest.

The results of observations made at several SMKs in Malang and interviews with SMK teachers in the Computer and Network Engineering (TKJ) expertise program found that the learning process carried out during the Covid-19 pandemic caused several problems, especially in the Broad-Based Network Technology subject. These problems include the limited laptop facilities that not all students have as well as the tools and materials that support practicum, the unavailability of Broad-Based Network Technology teaching materials

used during online learning so that students' understanding of the material is low, and delays in the submission of assignments by students. Based on these problems, students' interest in learning decreases.

Interest is the emergence of a feeling of liking and attraction from an individual to something without coercion [10].

2. LITERATURE REVIEW

2.1 Teaching Materials

Teaching materials are all materials, both tools, information, and texts that are arranged systematically, displaying the full figure of a competency that will be mastered by students and used in the learning process with the aim of planning and reviewing the implementation of learning [5].

Teaching materials are a set of learning materials that refer to the existing curriculum and are used to achieve predetermined competency standards and basic competencies [15].

The purpose of making teaching materials is to be able to help students learn the material and the teacher to convey the material, as well as provide various forms of teaching materials that students can choose to prevent boredom, help make it easier for students in the learning process, and make learning activities become more attractive to students [16].

Examples of teaching materials such as modules, handouts, textbooks, LKS (Student Work Sheets), audio teaching materials, interactive teaching materials and so on. Teaching materials that are effective and interactive will make students' motivation and students' attention increase to carry out the learning process.

2.2 Thematic Learning

Thematic or integrated learning is learning that relates subject matter to one another, certain concepts to other concepts, which are implemented spontaneously or planned, either in one or more fields to get a variety of student learning experiences and more meaningful learning [17].

The learning model uses an integrated thematic model influenced by the ideas of Jacobs [18] regarding Interdisciplinary Curriculum. The idea of Interdisciplinary Curriculum exists because it was triggered during school learning, where each student has to learn several different languages. So that makes learning disjointed and from one topic to another sometimes the material is not related even on the same day.

Based on the explanation above, it can be concluded that thematic learning is a learning approach that links

several subjects into one theme or concept so as to make students have a fun and meaningful learning experience. Through a thematic learning approach, it is hoped that students can think broadly and thoroughly and be able to relate experiences that are felt with the concepts they have so that they can be applied to everyday life.

2.3 Mobile Learning

Learning with wireless mobile technology will enable everyone to be able to access material and information anywhere and anytime [19]. Learning that applies tools and resources, will further shape the construct of students' knowledge, satisfied with curiosity, cultivating experience and being able to collaborate with others [20].

The term mobile learning or m-learning is the use of information technology devices such as PDAs (Personal Digital Assistants), mobile phones, laptops and tablet PCs which are used to help deliver material to be more interactive and effective.

It should be noted that mobile learning cannot replace traditional classes but can be used as a complement to the learning process in class [21].

2.4 Self-Regulated Learning

Self-Regulated Learning is a learning strategy in terms of self-management in learning activities. In terms of learning activities, students act as individuals who control their own learning activities, control motivation and academic goals, manage resources and decision makers and implementers in the learning process [13].

Self-Regulated Learning is the ability of students to play an active role in every learning process, both metacognitively, motivationally, and behaviorally. Metacognitive here is being able to plan, organize, monitor, and evaluate yourself. Motivational is that students can have self-confidence in terms of ability, self-confidence (self-efficacy) and independence in learning. The last is behavioral, namely students can reflect, arrange, and organize the environment so that it is more optimal.

2.5 Learning Interest

Interest is a feeling of interest, preference, focus, attention, persistence, skill and effort [22]. While learning is an effort carried out by an individual in obtaining changes in overall behavior as a result of experience interacting with the environment [23].

Interest in learning is explained as involvement and intentional desire for cognitive activity by including an important part of the learning activity, determining which part the individual chooses in learning and to what extent the individual can receive the given knowledge [24]. Meanwhile, according to Kpolovie, Joe, & Okto [25] who

define learning interest as a tendency to feel in getting something because individual students feel an interest in learning and are characterized by feelings of pleasure.

There is a relationship between interest and learning motivation because it has a significant influence on student achievement. Increased academic grades, structured learning strategies, good understanding, good self-efficacy are signs of students who have good interest and motivation to learn [26].

3. METHOD

3.1 Research and Development Models

The development model chosen in this research and development uses the 4D model by Thiagarajan, et al which has the acronym Define, Design, Develop, and Disseminate [27]. The 4D model was chosen because the stages are simple and systematic compared to other models. The basic principles in each development procedure have also been represented by not including the implementation and evaluation stages.

3.2 Research and Development Procedures

The following is an explanation of the development procedure using the 4D model in this research and development:

a. Define

This stage is used to define or define the conditions for media development. Defining can be done based on the results of observations during learning activities with (1) Front-End Analysis, (2) Student Analysis (Learner Analysis), (3) Concepts Analysis, (4) Task analysis (Task Analysis), and (5) Specific Instructional Objectives.

b. Design

Design or design that aims to design the initial product or prototype of the product to be developed. There are four steps at this stage, including: (1) Preparation of Test Criteria; (2) Selection of Learning Media; (3) Selection of Learning Formats; and (4) Preliminary Design.

It can be concluded that in this teaching material the media used is mobile-based. Mobile media was chosen because the characteristics of the material in this subject can contain text, images, audio and video. Another consideration is that based on observations, many TKJ SMK students have smartphone devices.

This teaching material also uses a self-regulated learning model approach so that students can also regulate themselves in managing their own learning process. There is a reminder feature that can be a reminder for students to regulate as well as a reminder for

students to study material that will be studied in the future.

The format for presenting and preparing Broad Based Network Technology material applies a thematic learning approach. In the mobile-based aja material that will be developed, the presentation of the material will emphasize the relationship of fiber optic material to life or daily activities so that students can more easily understand the material.

c. Develop (Development)

At the develop stage the development of this teaching material will be carried out, which was previously in the design stage still in the form of a prototype and produces the final product of the application of teaching materials. The software used in the development of this teaching material uses Android Studio which is based on the Java programming language. This stage consists of two steps, namely expert assessment and developer testing.

Expert assessment will be carried out by assessing or validating the product feasibility design that has been developed. This stage will be carried out by media and material expert validators, such as lecturers and supporting teachers who are experts in their fields.

Furthermore, in the developer test stage, a product trial that has been revised will be carried out. In this research and development, product trials were carried out in small group trials.

d. Disseminate

The final stage, Disseminate, is a trial of the finished product to real subjects on a larger scale. This stage will be the final result to assess the feasibility of the mobile-based teaching materials that have been developed. Then packaging and dissemination of the products that have been developed will be carried out to the trial subject schools which are limited to SMKN 6 Malang in the field of expertise in Computer Engineering and Informatics.

3.3 Product Validity Test

After the product is finished, a product validity test will be carried out in terms of materials and media which will be carried out by experts who are competent in their fields.

Material experts will be carried out by lecturers who support network courses and teachers who teach TJBL classes, in order to evaluate and validate the suitability of the content of the material for the teaching materials being developed. Meanwhile, media experts will be conducted by lecturers who have competence in the field of Information and Communication Technology (ICT). Later, from the validation results by media experts, the feasibility of the product being developed will be known.

3.4 Product Trial

Product trials are the stages in which to collect the data needed for the teaching material products being developed.

Trial Subjects

There were 3 test subjects, namely material and media experts, small group trials and large group trials. The small group trial will be conducted on 10 students from class XII TKJ SMKN 6 Malang. Furthermore, for respondents from the large group tryout, it will be carried out on 30 students of class XII TKJ SMKN 6 Malang.

Data Type

The type of data that will be obtained in the development of this product will use quantitative and qualitative data types. Quantitative data were obtained from research results which were given to material experts, media experts and test subjects. Meanwhile, the qualitative data obtained from the interview results were in the form of criticisms and suggestions from experts and product trial subjects.

Data Collection Instruments

The data collection instrument acts as a measuring tool for a product being developed. The instrument used is a questionnaire with the aim of determining the feasibility of the product being developed and will get input from respondents for future evaluation.

In this study using open and closed questionnaires which will be given to material experts, media experts, and test subjects. The open questionnaire contains criticisms, suggestions and respondents' responses to the products being developed. Meanwhile, for closed questionnaires containing alternative answers based on a measurement scale and in this study using a Likert Scale.

Data Analysis Techniques

Data analysis techniques in the development of teaching materials use content analysis techniques and percentage descriptive analysis. Content analysis techniques were used to gather criticisms and suggestions from the test subjects. Meanwhile, the percentage descriptive analysis technique refers to the feasibility of the product that has been developed [28]. The following is the equation of the formula used:

$$\text{Validity} = \frac{T_{sh}}{T_{se}} \times 100 \% \dots\dots\dots(3.1)$$

Information:

V = Percentage of questionnaire data per item

Tse = Total Score

Tsh = Maximum Total Score

As a reference for the feasibility of developing teaching materials, it will be obtained from the validity value which can be seen in Table 1.

Table 1. Criteria for Measuring Interest in Learning

Percentage (%)	Criteria	Description
81-100	Very High	Students' interest increased very well
61-80	High	Students' interest increases well
41-60	Average	Students are quite interested in learning
21-40	Low	Students' interest in learning is poor
0-20	Very	Low Students' interest in learning is very poor

Measuring student interest in learning uses the equation formula 3.2 as follows [29]:

$$P = f/N \times 100\% \dots\dots\dots (3.2)$$

Information:

P = Percentage (%)

f = Frequency that is being sought percentage

N = Number of Respondents

As a reference for knowing student interest in learning, the following are the criteria for measuring interest in learning which can be seen in Table 2.

Table 2. Validity Criteria

Percentage (%)	Criteria	Description
85.01–100.00	Very Valid	Feasible to use without revision
70.01– 85.00	Fairly Valid	Worth using with minor revisions
50.01 - 70.00	Invalid	Not suitable for use need major revisions
0.01 – 50.00	Invalid	Should not be used

4. RESULT AND DISCUSSION

4.1 Application Description

The results of the development and research carried out are in the form of application of thematic learning materials in the Broad Based Network Technology subject with a capacity of 14 MB. In this case the resulting application is named MyTJBL with TJBL being Broad Based Basic Network Technology.

The MyTJBL application has three basic competencies from KD3.4 to 3.6 which are translated into the main discussion material on Fiber Optic, namely understanding fiber optic networks, types of fiber optics and implementing fiber optic functions and work tools. The application of the self-regulated learning model lies in the existence of a reminder notification feature, which

functions as a reminder for students to be able to arrange and schedule their own material to be studied at certain hours or days.

4.2 Design and Development



Figure 1 Splash Screen

Figure 1 is the initial display when opening the MyTJBL application which includes the UM logo, MyTJBL logo, subject names, class names and there are picture illustrations.

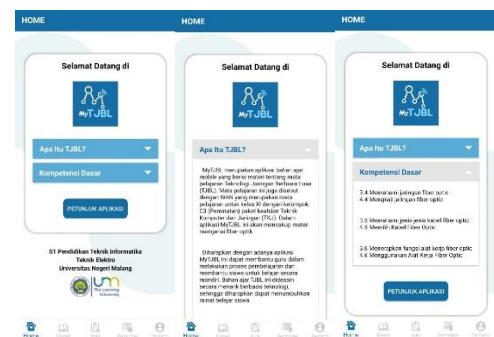


Figure 2 Home view

The page in Figure 2 is a display of the application's main page which contains the MyTJBL logo, MyTJBL application information and basic competencies that students will learn as well as application instructions buttons. The information presented is in the form of an explanation about the Broad Based Network Technology subject and the benefits of the MyTJBL application for students and teachers.

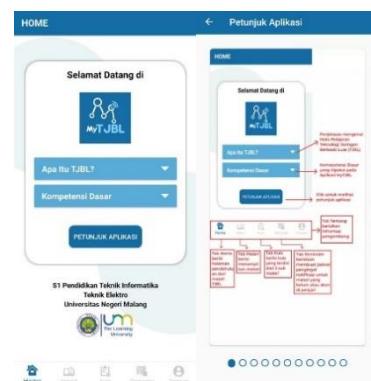


Figure 3 Application Guide page

Figure 3. The application guide page contains information on how to use the MyTJBL application. These instructions serve to facilitate users in using this application.



Figure 4 Material Menu Main Page

Figure 4. The material page contains 3 main materials presented in the MyTJBL application adapted to the basic competencies of the TJBL subject, namely KD 3.4-3.6 along with a brief introduction to the sub-material to be studied.

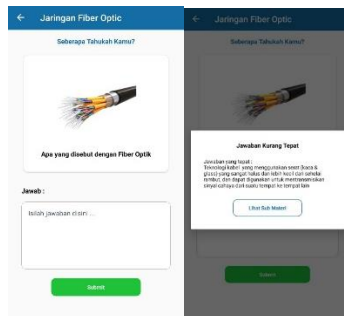


Figure 5 Pre-Test Pages

Figure 5. The pre-test page as an apperception to measure the level of knowledge of the material to be studied.



Figure 6 Content Pages

Figure 6. The material content page contains the selected sub-material. Sub-materials are equipped with pictures, text, and videos to support students' understanding and interest in learning. The MyTJBL

application runs semi-online, therefore the videos presented here must use an internet connection.



Figure 7 Quiz Menu

This quiz page contains 3 buttons that are used to open a quiz based on the main material that has been studied before.

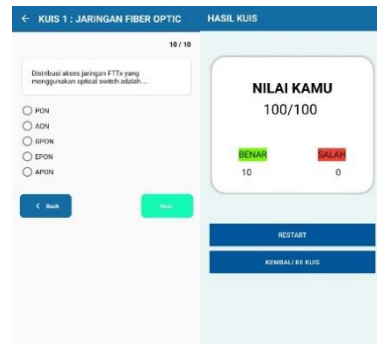


Figure 8 Quiz Display

On the quiz question page (Figure 8) there is information on the number of questions being displayed and the total number of questions. Furthermore, if the user has finished answering the quiz questions, the score for the money will be displayed.

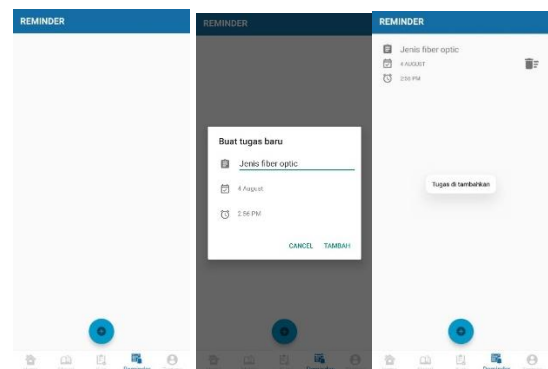


Figure 9 Reminders

On the reminder page (Figure 9) the user will be given the freedom to schedule reminders or reminders to study material at a later date by filling in the starting information, date and time. After the reminder has been

added, if the date and time are correct, a reminder will appear in the form of a notification.

4.3. Data Presentation and Analysis

Material validation on mobile-based teaching material products for TJBL subjects was carried out by material experts. These subject matter experts include competent lecturers in the field of Computer and Network Engineering and Broad-Based Network Technology subject teachers. Based on the results of the material validation, the score obtained from the results of the material expert validation obtained a percentage of 87.5% or Very Valid, the results can be seen in Figure 10.

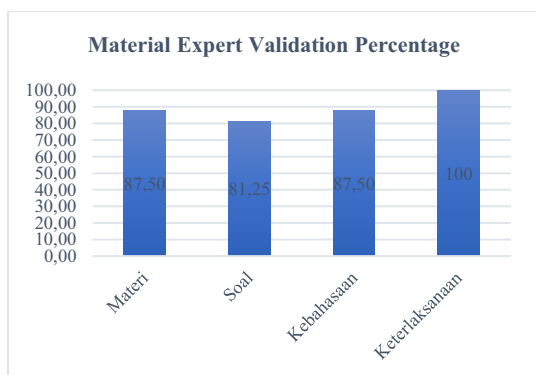


Figure 10 Graph of Material Expert Percentage

In addition to mobile-based teaching material products for TJBL subjects, material experts also conduct validation to media experts. Media experts who will carry out the validation are lecturers who have the ability and knowledge in the field of Information and Communication Technology (ICT). Based on the results of media validation, the scores obtained from media experts obtained a percentage of 96% or Very Valid, the results can be seen in Figure 11.

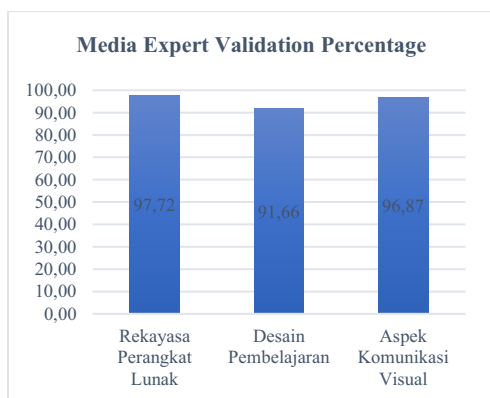


Figure 11 Media Expert Percentage Chart

After the trials of material experts and media experts, a small group trial of 10 TJH class XII students who had taken the Broad-Based Network Technology subject was carried out. This small group trial was taken based on a respondent trial questionnaire using quantitative data. Based on the results of distributing the questionnaire, it

was found that the score obtained from the small group trial obtained a percentage of 86.90% or Very Valid, the results can be seen in Figure 12.

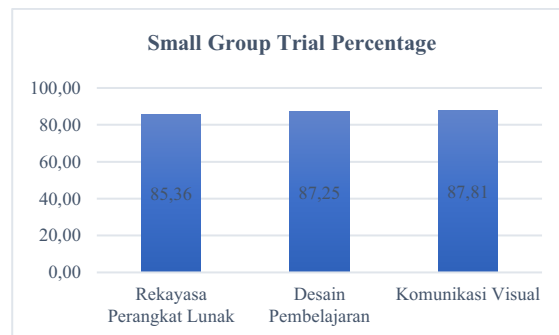


Figure 12 Small Group Trial Percentage Chart

This large group trial or field test was carried out by 30 students from class XII TKJ who were taking Broad Based Network Technology (TJBL) subjects. Based on the results of distributing the questionnaire, it was found that the score obtained from the large group trial obtained a percentage of 88.27% or Very Valid, the results can be seen in Figure 13.

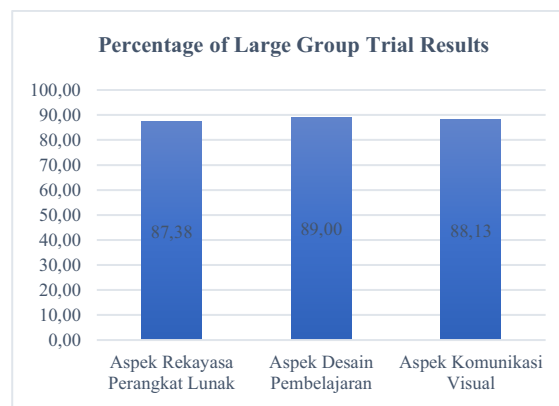


Figure 13 Large Group Trial Percentage Chart

In this research and development, the interest in learning is measured in students who are taking or have taken broad-based network technology (TJBL) subjects. The assessment of interest in learning was carried out by 30 students from class XII TKJ. In measuring students' interest in learning this is done by means of a questionnaire attached to the instrument of interest in learning using quantitative data.

Quantitative data includes 4 aspects, namely: (1) feelings of pleasure; (2) student interest; (3) student attention; (4) student involvement. The small group trial consisted of 25 questions. Based on the results of measuring student interest in learning according to Arikunto (2018), the average percentage obtained is 89.33% or Very High. The following is a graph of student learning interest data which can be displayed in Figure 14.

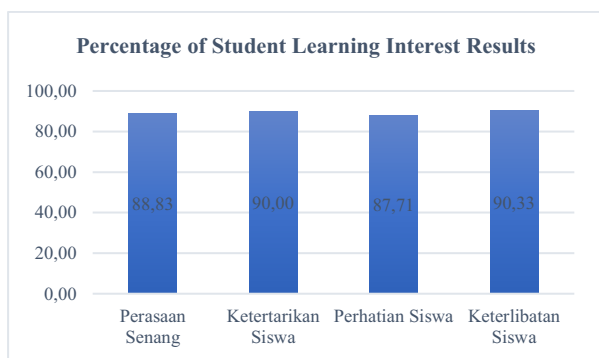


Figure 14 Graph of Student Learning Interest Percentage

5. CONCLUSIONS

MyTJBL is a mobile-based thematic learning material application for Broad-Based Network Technology subjects. This application uses a self-regulated learning model approach to be able to regulate the way each student learns according to their needs. The material in this application is KD3.4 to 3.6 such as understanding fiber optic networks, types of fiber optics and applying fiber optic functions and work tools. Therefore, the purpose of this application will be able to foster student learning interest while studying fiber optic material.

Based on the results of research and application development of thematic learning materials for Broad-Based Network Technology subjects that have been carried out through validation and trials, it can be concluded that the validation of material experts obtains a percentage of 87.5% classified as "Very Valid", validation of media experts obtains a percentage of 96% classified as "Very Valid", the results of the small group trial with 10 students obtained a percentage of 88.27% classified as "Very Valid", the results of the large group trial with 30 students XII TKJ obtained an orientation of 88.27% classified as "Very Valid", and to measure students' interest in learning, a percentage of 89.33% is classified as "Very High".

From the trial results it can be concluded that the application of mobile-based thematic learning materials with a self-regulated learning model in the Broad-Based Network Technology subject to foster interest in learning in class XI TKJ is stated to be very valid and suitable for use in or outside of learning.

There are several suggestions that need to be considered for further development, such as being able to add material and quiz questions, making it easier to install this application, uploading it like on the Google Playstore and updating the reminder feature settings to make it more flexible.

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