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Development of Mobile Application Media to Grow Students' Interest in Learning Print Graphic Design at the Vocational High School Level

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Abstract: Vocational High School (VHS) or SMK aims to produce graduates who are ready to work in accordance with their competencies. However, field facts show that there are many problems in the learning process, especially in printing graphic design (PGD) subjects so that conceptual understanding and student interest in learning PGD material have not been achieved. The purpose of this research is to create a mobile learning that can foster students' interest in learning and conceptual understanding of PGD material using a contextual teaching and learning model. The object of this research is vocational school students who have taken printing graphic design subjects. The research model uses the Sugiyono R&D model with the development product in the form of a mobile application with apk extension which is developed using Android Studio. The results of the use trial validation get an average percentage of 87.88%. While the average result of the test of student interest in learning gets a percentage of 82.8% and indicates that CTL-loaded mobile learning is very feasible to use and has a very high influence in growing vocational students' learning interest in PGD material.

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1 Introduction

Vocational education is secondary education which aims to create graduates who can work in their respective fields. Vocational High School is one of the education systems that serves to prepare students to be ready to work according to their field of competence [1]. Print graphic design (PGD) is a C3 subject and must be taken by vocational high school students majoring in multimedia. PGD has learning materials with a total of 432 hours of lessons. Printing graphic design lessons aim to equip students with the skills to identify and apply the graphic design processing methods used by the printing industry today. Knowledge and skills of PGD lesson concepts are one of the factors to obtain multimedia vocational graduates with competencies needed by the industrial world.

Field facts show that there are still many problems in learning PGD so that students' interest in learning and conceptual understanding has not been achieved. According to the results of a

questionnaire on class XII students majoring in multimedia at SMKN 10 Malang, it can be concluded that (1) students prefer to learn through smartphones rather than textbooks, (2) students prefer to learn using interesting applications, (3) there is no media that teaches design. printing graphics conceptually, (4) students need subject matter that is in line with the needs of industrial practice. Reinforced by the results of the interview with the chairman of the multimedia department at SMKN 3 Batu, namely (1) the unavailability of independent learning media to support printing graphic design lessons, (2) limited study time due to clashing with industrial practice schedules (3) printing graphic design lessons that have not been explained conceptually, and (4) student interest in learning that has not been maximized in learning PGD. One of the problems in learning PGD is the learning media which is still in the form of modules, books, and power point presentations. The rapid development of information technology makes conventional media irrelevant to the needs of students. In addition, the practical stages are more difficult to describe in detail when using books or modules. The challenges of the COVID-19 pandemic also make it difficult for students in the practicum process because students have to study independently at their respective homes.

Referring to the results of the Central Statistics Agency (BPS) survey [2] in February 2020, the number of unemployed in Indonesia increased by 60,000 people. The open unemployment rate (TPT) for vocational high school graduates has a percentage of 8.49%, while the highest number of open unemployment by age group is 16.28% in the young population (15-24 years). The learning process should be able to make students able to connect the context of the material being studied into the real world. Contextual understanding of learning materials will enable SMK graduates to apply the knowledge gained to work in the industrial world. This contextual learning model should be used by teachers in preparing vocational students to be competent in their fields. The problem of contextual understanding must be addressed immediately so that SMK graduates get material that can be implemented in the world of work directly.

Contextual teaching and learning or CTL is a teaching and learning activity that serves to help students understand the meaning of the material being studied by connecting the content of the lesson with the context of everyday life [3]. The achievement of conceptual understanding that has an impact on good learning outcomes so that students are more easily accepted and adaptable in the industrial world.

Mobile learning is a learning activity carried out through mobile technology devices so that it can be used anytime and anywhere to help the learning process [4]. The use of smartphone media is also a solution for online learning during the COVID-19 pandemic so that the number of virus spreads can be prevented. This is a good potential for the author to develop a mobile-based learning media.

The number of Android-based smartphone users in Indonesia is the highest compared to other operating systems, which is 92.4% in January 2021. This potential shows that mobile learning media is suitable to be developed using an Android-based operating system. The minimum android version used by the Indonesian is Android version 4.4 or KitKat with a total of 0.84% in January 2021 [5]. Based on this fact, mobile learning is designed to be able to run at least on the Android KitKat version so that it can be accessed by all SMK students in Indonesia. Learning to use a smartphone makes learning time not limited to school because it is mobile. Mobile learning strategies make it easier for students to understand the content of the material

and basic competencies completely and in a more effective time than conventional learning media. [6].

Based on these data, the characteristics of interest in learning PGD that have not been met and need to be observed are (1) there is no individual learning media that can foster student learning desires, (2) lack of enthusiasm for PGD material, (3) there is no mobile learning that is fun and fosters learning. student interest (4) students need learning media that contains visual material. High interest in learning will make students pay attention to learning activities in a focused manner and feel happy while learning [7]. The implementation of the CTL method has been shown to have a significant effect on increasing interest in learning in multimedia vocational students majoring in multimedia. Students who have low interest in learning after being taught with CTL learning have the highest learning outcomes and a significant increase after being given treatment [8]. The use of the CTL method is expected to replace conventional methods to foster interest in learning for vocational students in PGD lessons.

Based on these problems, this research is aimed at developing a mobile learning with the title "Mobile Learning Media Printing Graphic Design with Contextual Teaching and Learning Models to Grow Student Interest in Multimedia Competency at SMK Level" so that it can be used for complementary learning media in Printing Graphic Design learning. in SMK majoring in multimedia. This mobile learning is named DISGRAMANA which consists of PGD subject matter in KD 3.1 applying graphic design & nirmana, 3.2 applying typography according to media and 3.3 applying the principles of sketching and illustration. This mobile learning is based on the Android operating system which includes material features in the form of textual material, explanation videos, video tutorials, work simulations and evaluations. The material provided will contain a contextual teaching and learning model so that students' contextual understanding can be achieved.

2 Literature Review

2.1. Learning media

Learning media are all tools that can be used for teaching and learning activities and have the aim of conveying facts in the form of learning information to students [9]. All tools that can be used to disseminate information from the sender to the recipient so that the recipient gets stimulated attention, thoughts, and interest in residual learning so that learning activities can occur can be categorized as learning media [10]. Learning media is a tool for students to understand a material easily so that students' memories can be maintained for a longer time [11].

Something that can be used to convey learning material so that learning objectives are achieved can be categorized into learning media [12]. Good learning media will make the learning process interesting and more effective. The use of learning media as needed will increase students' interest in learning in carrying out their learning activities compared to conventional methods such as lectures.

Learning media has several important functions in learning activities. Online learning media makes it easier for students to interact with other students through peer teaching to reduce distance and time [13]. Learning media has five functions, namely (1) a communicative function that makes it easier for students and teachers to communicate, (2) a motivational

function so that the media can make it easier for students to learn the material by increasing students' interest and passion for learning, (3) a meaningful function which means that the media can increase students' interest and enthusiasm for learning. the quality of analysis in high-level cognitive aspects, (4) the function of conveying perceptions that allow students to equate views and minimizing misunderstandings in the delivery of information provided by the teacher, and (5) the function of individuality so that students can learn according to their learning needs according to their respective learning styles. -respectively [14].

2.2. Mobile learning

Mobile-based learning or often called mobile learning is a learning process carried out using tools that can be taken anywhere and accessed anytime. The purpose of mobile learning is to facilitate learning, not to complicate the learning process. Mobile learning is an alternative to electronic learning in the process of conveying knowledge, skills and attitudes by combining the pedagogic design of teachers in providing digital support for communicative, adaptive, collaborative and productive learning activities in the school environment [15].

Mobile learning media is learning that utilizes mobile devices as learning media so that learning activities can be carried out anytime and anywhere 1[6]. Mobile learning can help students in getting lessons with only their fingers so that this media can be used anywhere [4].

Mobile learning is the development of E-Learning which has an interesting way in the teaching and learning process [17]. The use of mobile devices is intended to foster interest in learning and students' attention when learning activities are carried out. With mobile-based learning, it is hoped that students can understand each subject matter and can achieve learning goals in the most effective and efficient way.

2.3. Contextual Teaching and Learning

Contextual teaching and learning (CTL) or contextual learning is a learning concept that relates material to real situations in students' daily lives so that the material taught can be applied to everyday life. CTL is a teaching and learning process to help teachers relate material to real life to increase students' interest and motivation in applying the material they have acquired so as to make lessons more meaningful [18]. CTL is a learning activity that emphasizes student involvement in finding the material being studied and connecting it to everyday situations so as to encourage students to apply it in real life [14].

CTL is an educational activity with the aim of helping students see meaning in the subject matter in class by connecting it to the subject in their daily life [3]. Contextual learning requires the cooperation of teachers and students. Teachers play a big role in motivating students. Some contextual strategies that can be applied are problem solving, learning from the environment, group work, community collaboration, and the real application of learning materials [19], [20].

2.4. Printing Graphic Design Course

Printing Graphic Design (PGD) is a C3 subject for multimedia vocational students majoring in. The PGD subject aims to provide students with the skills to identify, apply, understand, analyze, and evaluate graphic design technologies and results used in the printing industry. The purpose of the material in the PGD subject is that students are expected to be able to practice

graphic design required by the printing industry.

The basic competencies applied in this study include KD (3.1) applying the basics of graphic design and nirmana (3.2) applying typography according to media and (3.3) applying the principles of sketches and illustrations. This basic competency was chosen because the characteristics of this material are theoretical whose material delivery is often carried out through teacher centered learning methods which are considered less effective and not interactive.

2.5. Interest to learn

Interest can be interpreted as a liking, desire, or inclination of the heart in an activity or activity. Interest is a person's tendency to remember and pay attention to some favorite activities [21]. In the learning process, interest in learning will make students encouraged to show their attention or participation in participating in learning activities. Interest in learning is a passion or a great desire for a thing or activity [22].

Interest in learning can arise if students get stimulation from outside such as learning activities that are fun, interesting, active, and not boring. Someone with a high interest in learning has a persistent tendency to remember an activity consistently and feel happy [7]. Interest will appear automatically without anyone telling. Interest can be expressed in the form of participation in an activity or direct statement. [23].

Learning is a series of activities to obtain behavioral changes because of one's experience of affective, cognitive and psychomotor aspects [7]. Learning will shape a person's competencies, skills, and attitudes through internal mental processes that cause long-term behavioral changes [24]. Learning is an internal change of a person in the form of knowledge, skills and attitudes obtained from an individual experience. Student learning satisfaction has an influence that can encourage achievement and enthusiasm for learning during the learning process [25].

Interest in learning is the emergence of students' desire to follow and pay attention to the learning process without any encouragement or coercion. The interest in learning experienced by a person will settle and develop naturally so that every experience gained in each learning activity becomes meaningful. Interest in learning will arise naturally if you get the support of a good learning experience from the environment.

3 Methodology

Mobile learning in this study was developed using the Sugiyono development (R&D) model. R&D is a research development model to produce educational products with high effectiveness and feasibility. Sugiyono's R&D model consists of ten systematic stages that aim to create a product with a high level of validity. This R&D model consists of several steps starting from the search for potential problems, data collection to final product revision and mass production [26]. The flow of the development of Sugiyono's model is similar to the waterfall concept of Borg & Gall [27] with several differences in the way each stage.

Sugiyono's development model requires several revisions and trials. The revision and trial process will be validated by experts to produce a product with a high level of validity. This research was conducted using the Sugiyono development model based on the research objective, namely, to create learning media that have a high level of validity or feasibility. The

stages of mobile learning development using the Sugiyono development method are as follows.

3.1. Potential problems

Based on the results of observations on XII students majoring in multimedia at SMKN 10 Malang City, it can be concluded that PGD learning is still not optimal, and students' conceptual understanding has not been achieved. This conceptual understanding problem has an impact on SMK graduates who are not ready to work. Several factors that cause conceptual understanding problems are (1) learning models that are still based on text and images, (2) students prefer to learn via smartphones rather than textbooks, (3) minimal learning time due to colliding with industrial practice schedules and (4) there is no learning media that conceptually prints graphic design material.

3.2. Data collection

Based on the thesis, previous research, and international journals that have been collected, it is known that conceptual understanding can be achieved by implementing the CTL model. In addition, it was found that the use of smartphones was very helpful for students in doing online learning (online). With these findings, this development research has the aim of making a mobile learning product that contains a CTL model for PGD subjects.

3.3. Product design

This mobile learning design is based on the results of the analysis of potential problems and data collection that has been carried out. The material is designed based on the syllabus of the multimedia SMK majors in the 2013 revised 2018 curriculum and developed according to the concept of contextual teaching and learning.

3.4. Design validation

The design validation process is carried out by experts by assessing the product design rationally. Design validation is carried out by material and media experts to get input, criticism, and constructive suggestions to create a viable product. Media and materials experts are competent practitioners in their fields. The data from the validation results were obtained from the questionnaire instrument.

3.5. Design revision

The results of the validation from media and material experts will be evaluated and used as a reference for improvement at the design revision stage. At the design revision stage, product revisions are carried out in accordance with the directions of experts to be able to proceed to the product trial stage with limited or small-scale respondents.

3.6. Product Trial (Small Scale)

The results of the improvement of mobile-based learning media were then tested on a sample of SMK students majoring in Multimedia class XI who had taken printing graphic design subjects. The sample is a small part of the subject that has characteristics to represent the entire population.

The number of samples for research using experimental or control groups requires a minimum

of 10 to 20 people [26]. Based on that, the trial at this stage will be taken as many as at least 10 respondents to fill out the product trial instrument. The trial of this product was carried out to determine the feasibility of the learning media for a limited number of users or students. Mobile learning that has been tested will be assessed by students using a questionnaire instrument that has 8 aspects, namely content quality, learning goal alignment, feedback adaptation, motivation, presentation design, interaction usability, accessibility, and user experience.

3.7. Product revision

After getting the results of the product trial, the data will be evaluated and input from the respondents will be used as a reference for product revision. If the validation results show a 'fairly decent' or 'very feasible' level of feasibility, the product can be tested on a larger number of respondents. Product improvements at this stage are useful for creating reliable media for a wider number of users.

3.8. Usage Trial (Large Scale)

The revised product will be tested on a wide scale of respondents or students. The number of respondents who are eligible to be used as research references are as many as 30 to 500 respondents [27]. According to another opinion, the minimum number of respondents for a study is 30 people, this is because the score distribution approaches the normal curve if the number of respondents is 30 or more [28]. Based on that, the researchers conducted a trial use to a minimum of 30 and a maximum of 500 SMK students majoring in Multimedia class XI who had taken PGD subjects. The use trial process aims to determine the feasibility value and interest in learning the media developed.

The results of the data obtained from filling out questionnaires by students and experts will be used as a reference for revision and data analysis for this development research. The eligibility criteria for a learning media can be seen in Table 1. Then to determine the level of student interest in learning can be seen in Table 2.

Table 1 Learning media eligibility criteria

No	Percentage	Criteria	Follow-up
1	85,01% - 100%	Very Feasible	Without Revision
2	70,01% - 85%	Fairly Feasible	Small Revision
3	50,01% - 70%	Less Feasible	Big Revision
4	1% - 50%	Not Feasible	Forbidden to use

Table 2 Criteria for student learning interest

No	Percentage	Criteria
1	$80\% < P_m \leq 100\%$	Very High
2	$60\% < P_m \leq 80\%$	High
3	$40\% < P_m \leq 60\%$	Enough
4	$20\% < P_m \leq 40\%$	Weak

4 Development result

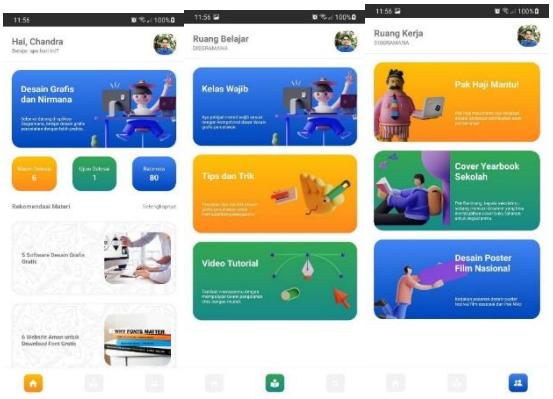
The mobile learning developed is named DISGRAMANA and is built using Android Studio with the product being an android application with apk extension. DISGRAMANA can be operated on android smartphones with a minimum version 4.4 (KitKat) and a size of 39.8 MB (Megabytes). DISGRAMANA features compulsory classes, tips & tricks, video tutorials and a workspace that implements the CTL component which aims to foster interest in learning for multimedia vocational students majoring in graphic design subjects. This mobile learning was developed using the Sugiyono development model with the aim of testing the feasibility of the media so that it can be used in printing graphic design learning activities.

The learning media developed discusses the subject matter of printing graphic design for class XI odd semesters. Learning materials consist of three basic competencies according to the 2013 revised 2018 curriculum, namely: (1) basic graphic design and nirmana, (2) typography according to media and (3) basic principles of sketching and illustration. The implementation of the CTL model is expected to foster interest in learning and students' contextual understanding of printing graphic design subjects. The following are the content and features that can be accessed on the DISGRAMANA learning media.

4.1. Media description

The main menu of DISGRAMANA is divided into three namely Dashboard, Study Room and Workspace. The dashboard displays students' personal information about the number of materials read, the number of exams completed and the average test score. In addition, there are material recommendations in the form of recommendation articles about the world of printing graphic design. The Study Room features three features, namely compulsory classes, tips and tricks and video tutorials. The Workspace features three different work briefing scenarios. This feature implements a modeling component, which is an important aspect of the CTL model.

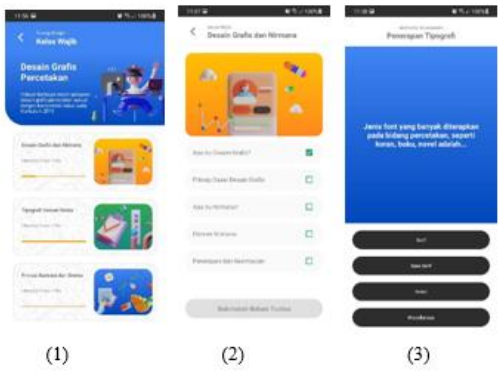
Figure 1 Disgramana Main Menu Display (1) Dashboard, (2) Study Room, (3) Workspace



(1) (2) (3)

The Compulsory Class feature presents three basic competencies for PGD subjects, namely (1) graphic design and nirmana, (2) typography according to media, and (3) illustration and sketch principles. This page shows the number of video material and also the learning progress of each KD. Sub Materials explain each sub material in the selected KD. Each sub-material has an authentic assessment to ensure students learn the sub-material. If all the sub-materials have been studied, students can take the exam on the KD that has been fulfilled. Each sub-material contains an authentic assessment or authentic assessment which aims to ensure that students really understand the material provided. After all sub-materials are completed, students can take the exam on each basic competency.

Figure 2 (1) 'Kelas Wajib' Pages, (2) Sub Materials, (3) Authentic Assessment



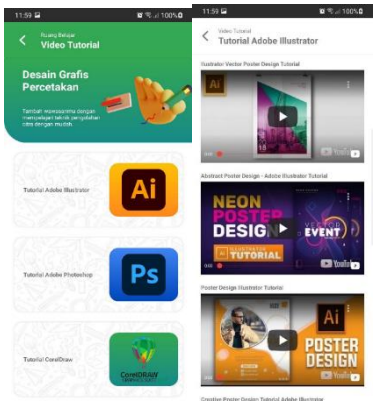
(1) (2) (3)

There is a Tips and Tricks feature that presents some graphic designer tips that aim to provide student learning supplements. Articles about tips and tricks are designed to stimulate students' interest in learning various things about graphic design so that the objectives of PGD lessons can be achieved.

Figure 3 Tips & Tricks Page

The Video Tutorial feature presents several graphic design tutorials using image processing software commonly used in the industry. This feature aims to provide learning supplements and real examples of the form of printing graphic design.

Figure 4 Video Tutorial Page



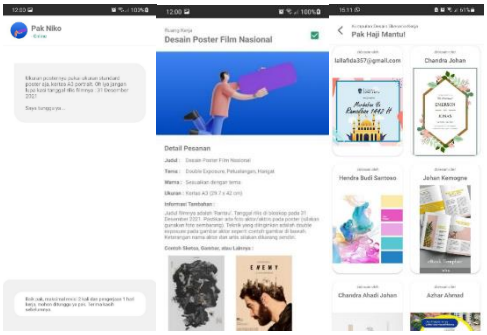
The Profile feature provides student information in the form of the status of the material that has been studied, the number of exams that have been completed, and the average student test score. In this feature students can edit the name and class if an error occurs when registering the application. Students can also add a profile photo to make the app feel more personal.

Figure 5 Profil Page

The Scenario and Work Briefing page implements the Modeling feature, where students will be given a conversation scenario to get a design brief to work on. Students will be directed to a chat page with a client that implements the modeling component of contextual teaching and learning. This feature is useful for demonstrating the work briefing process as an example that

students can imitate when dealing with clients so as to avoid theoretical-abstract learning [29]. After students collect designs according to the brief given, students can see the results of the designs that have been uploaded, so students can see the results of other students' work. On the work scenario design page, students are expected to be motivated in making their best designs.

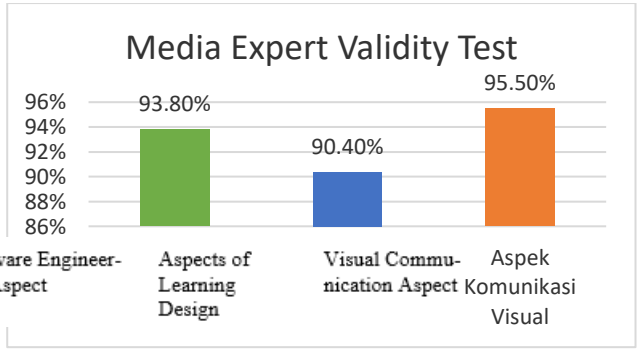
Figure 6 'Skenario' and 'Briefing Kerja' Page



4.2. Finding and Discussion

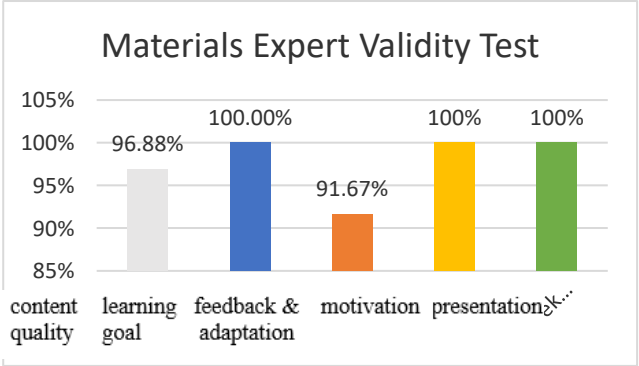
The percentage gain for each aspect has been classified as a very feasible criterion. The average value of all aspects obtained is 92.65% and can be categorized as very feasible so that the validation of the feasibility of media experts is only done once. After the media expert validation process is carried out, the media will be tested to material experts to see the feasibility of the material contained in the learning media.

Figure 7 Media Expert Validation Result Data Graph



Validation activities by material experts aim to determine the level of feasibility of learning materials used in learning media.

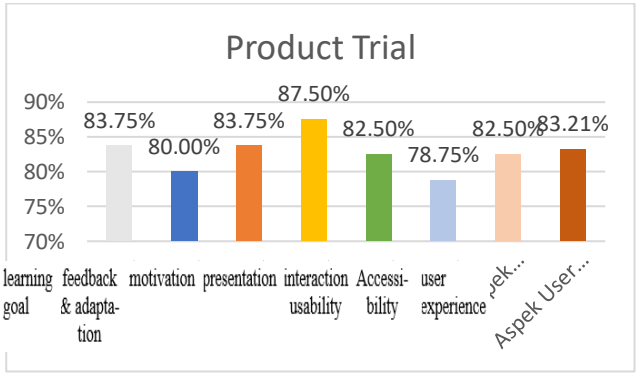
1. **Figure 8** Material Expert Validation Result Data Graph



The percentage gain of content quality aspect is 96.88%, learning goal alignment aspect is 100%, feedback and adaptation aspect is 91.67%, motivation aspect is 100%, then presentation design aspect is 100%. The average value of all aspects obtained by material experts is 96.43% and can be categorized as very feasible so that the validation of the feasibility of material experts is only done once.

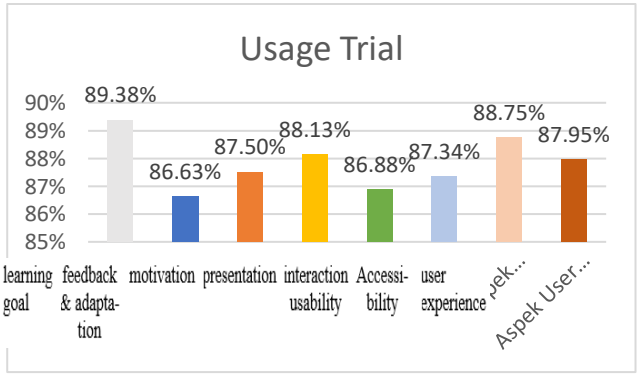
After the product is revised from the suggestions and entered the design validation process, a product trial or small-scale trial is carried out. The product trial process aims to determine the feasibility of learning media before being used for the learning process with a wider number of students. The product trial activity was carried out on May 4, 2021, which was carried out by 10 student respondents of SMKN 03 Batu and SMKN 10 Malang who had taken printing graphic design subjects. This product trial was carried out using a questionnaire with the aim of obtaining validation results in the form of percentages, criticisms, suggestions, and conclusions from users.

Figure 9 Product Test Result Data Graph



The percentage gains from all aspects of user validation are content quality of 83.75%, learning goal alignment aspect of 80%, feedback and adaptation aspects of 83.75%, motivational aspects of 87.5%, presentation design aspects of 82.5 %, interaction usability aspect is 78.75%, accessibility aspect is 82.5% and user experience aspect is 83.21%. The average of the eight aspects obtained is 82.5% which is included in the category of quite feasible to be tested in large groups.

Figure 10 Data Graph of Usage Trial Results

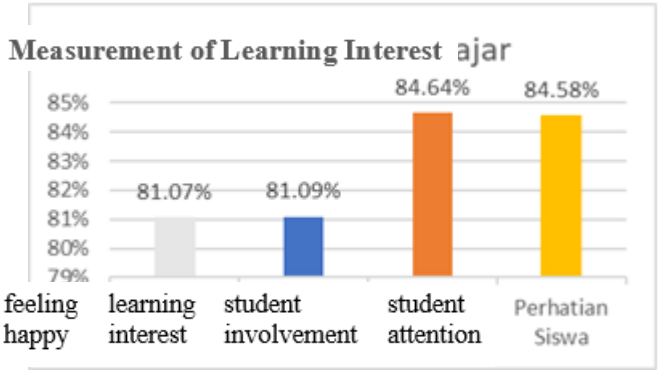


The percentage of test results obtained from all aspects, namely the content quality aspect of 89.38%, the learning goal alignment aspect of 86.63%, the feedback and adaptation aspect of

87.5%, the motivation aspect of 88.13%, the presentation design aspect of 86.88%, interaction usability aspect is 87.34%, accessibility aspect is 88.75% and user experience aspect is 87.95%. The results of the data show an average of 87.71% of all aspects assessed so that the media is classified in the very worthy category to be used as learning media for printing graphic design subjects.

The interest in learning trial has the aim of knowing the percentage and category of student interest in learning towards product development. The interest in learning trial in this study was carried out on 5-7 May 2021 conducted by 40 student respondents of SMKN 03 Batu and SMKN 10 Malang who had used the DISGRAMANA application that had been developed. The interest in learning trial was carried out using a questionnaire with the aim of getting the percentage of student interest in learning.

Figure 11 Graph of Learning Interest Test Results Data



The percentage gain for all aspects, namely, the aspect of feeling happy is 81.07%, the aspect of learning interest is 81.09%, the aspect of student involvement is 84.64%, and the aspect of student attention is 84.58%. In general, the average overall aspect is 82.5% so that it belongs to the category that students' learning interest in printing graphic design material is very high after students use learning media.

Table 1 Learning media eligibility criteria

Ideal Interval	Frequency	Percentage	Category
>= 81	23	57.5	Very High
75 - 80	9	22.5	High
68 - 74	4	10	Enough
61 - 67	2	5	Weak
<= 60	2	5	Very Weak
Total	**40**	**100**	

The frequency of students who have very high learning interest is 23 students with a percentage of 57.5% of the total 40 respondents followed by 9 students with high learning interest, 4 students with moderate learning interest, 2 students with low learning interest and 2 students with very high learning interest. low. These results indicate that more than half of the

respondents (57.5%) have a very high interest in learning about printing graphic design materials after using the DISGRAMANA application.

The average percentage of student learning interest test results is 82.8% which refers at Table 3 in terms of the criteria for learning interest, learning media can foster student interest in learning with 'Very High'. Based on the analysis and elaboration of the results of the learning interest trial above, the DISGRAMANA application is proven to be able to foster student interest in learning and can be used as complementary teaching materials for teachers in the printing graphic design learning process. This is in accordance with research that with more and more information being disseminated in digital form, it will further increase interest in learning and this is important in the learning process of the current era. [30], [31].

5 Conclusion

The design of DISGRAMANA mobile learning is carried out based on an analysis of needs, potential, background, and problems which are then formulated and designed using figma interfaces to facilitate the preparation of product layouts and materials. The design in the form of a UI design and flowchart is then used as a reference in working on the product so that it becomes an apk extension application.

Mobile learning media for printing graphic design subjects with CTL has been developed for students of Vocational High Schools majoring in multimedia. The developed media has been tested for its feasibility level by media experts, materials and students majoring in multimedia who have taken printing graphic design subjects and the results are that the learning media is classified in the Very Appropriate category for use in the learning process.

The developed media has been tested by vocational students majoring in multimedia to get validation results, namely learning media that can foster interest in learning in printing graphic design subjects with very high criteria.

Suggestions for further product development can be done by refining the products that have been developed, namely (1) the Workspace feature can be developed again so that the results of uploading designs from each student can be commented on and liked by other students so as to create a good learning community, (2) Subject matter that is still focused on KD material for semester 1 in printing graphic design subjects can be added so that it becomes material for 2 semesters in accordance with the syllabus for printing graphic design subjects, (4) Add security to DISGRAMANA application user data, (5) Add features chat or group assignments so that students can discuss and implement the learning community component of the CTL model, and (6) Conduct experimental research by comparing classes that apply DISGRAMANA media with classes without applications to determine the effectiveness of using learning media that has been developed.

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