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Development of Interactive Digital Modules to Increase Knowledge of 3-Dimensional Fine Art Creation Material

Rifka Komala Syabila[1], Abdul Rahman Prasetyo[2]
[1,2]Pendidikan Seni Rupa, Universitas Negeri Malang, Malang, Indonesia
rifka.komala.2102516@students.um.ac.id[1], prasetyo.fs@um.ac.id[2]

Abstract

Cultural arts subject matter on the creation of 3-dimensional applied art works uses a general summary of the material without adjusting the needs of students and integrating technological developments. Students of class XII-E at SMA Negeri 1 Tumpang experience problems in understanding the knowledge material of the creation of 3-dimensional works of art. The solution that can improve students' understanding of the material is the development of flipbook-based interactive digital modules. This research aims to analyze the needs, develop more innovative and interesting digital modules, describe the results of the analysis of the effectiveness of interactive digital modules in cultural arts subjects on the material of creating 3-dimensional applied fine art works in class XII-E at SMA Negeri 1 Tumpang. The method used in this research is using R&D (Research and Development) with the 4D model by Thiagarajan with 4 stages namely Define (defining), Design (planning), Development (development), and Dissemi-nate (dissemination). The results showed that students need more interactive media. The results of the material and media expert validation trials scored 96% and 90% with very valid criteria. The results of the practicality test of the flipbook-based interactive digital module are feasible to use with 93% module practicality test results with very feasible criteria, and the effectiveness test gets 0.78 if adjusted to the N-Gain Score obtaining high category effective criteria. The criteria obtained indicate that the use of interactive digital modules helps students understand the material for creating 3-dimensional applied art works very effectively in the learning process.

Keywords: Interactive Digital Module, Flipbook, 3-Dimensional Applied Fine Art Works

INTRODUCTION

Cultural arts subjects consist of three important aspects in it, namely aspects of knowledge (cognitive), affective aspects (attitudes / appreciation), and aspects of skills (psychomotor) (Rofian, 2016). Cultural arts subjects in class XII at Senior High School 1 Tumpang, which study fine arts with one of the materials is the creation of 3-dimensional applied fine arts, have not been able to use the independent curriculum cultural arts printbook as the main reference for learning activities. In learning activities, students easily feel bored and do not capture the material and information being studied because they are less interested in learning using the lecture method and are monotonous without integrating technological developments. Technology integration can increase efficiency and productivity in the learning environment (Putri, 2023). Learning productivity will not be effective and efficient if educators cannot manage and present learning resources that suit the needs of students.

The independent curriculum printed book until now still provides only the teacher's handbook. So that students do not have the main learning resource in learning cultural arts (fine). Educators utilize teaching materials in the form of material summaries in the hope that they can serve as a tool to learn the basic concepts of the material effectively and efficiently. However, the teaching materials prepared by the educator only contain a summary of the general explanation of the material. From these problems, students cannot achieve the learning competencies that should be mastered. Learning competencies are abilities that must be achieved by students in the form of aspects of knowledge, aspects of skills, aspects of values and attitudes and applied to the habit of thinking and acting (Fakhri, 2023).

Teaching materials that are prepared as learning resources for students in the form of material summaries are used without further and detailed explanations by educators through the lecture method. The resulting impact of these problems is the existence of misunderstandings or misconceptions so that students continue to make mistakes without knowing how to solve the problems at hand. The existence of limitations in skills that require higher-level skills or critical and creative thinking results in a decrease in the performance, interest, and motivation of students in the learning process From the problems of students and educators obtained, it can be concluded that there is a need for learning media in the form of teaching materials that integrate technological developments, adjust the needs of students, and learning objectives.

The use of teaching materials is one of the most important learning resources to be used in the learning process. Teaching materials are learning resources used by students to gain knowledge and information both from the aspects of knowledge, skills, and experience when learning (Fitri, 2019). Teaching materials can be more effective and maximized in the learning process if educators can apply or implement the learning process properly. This is based on the ability of educators to choose relevant teaching materials, understand learning objectives, and convey information in an interesting and easy to understand way for students. Educators have a role as facilitators, which means that they can make it easier for students in the process of learning activities (Mubarok, H., et al., 2022).

Educators have an important role when using teaching materials, including as a guide and facilitating students in conveying and understanding learning topics. The use of interesting teaching materials can help learners gain more knowledge and skills. Teaching materials that integrate technology can help the learning process and are very important to create an interesting learning atmosphere that makes students active in every process. Teaching materials presented in digital form can be interesting and provide convenience so that they can help and complement the role of educators as information providers for students (Najuah et al., 2020). Teaching materials that include supporting images have an important role, namely being able to describe or visualize learning material effectively and interactively so as to increase understanding and learning outcomes to increase and maximize. The use of supporting images and videos in teaching materials really helps students to understand concepts in a short time.

Educators need to develop interactive teaching materials by adjusting the needs of students and learning objectives. The development of interactive teaching materials is one form of solution for researchers in creating a learning that is increasingly developed, interesting, and easily understood by students. Interactive digital modules are one way to develop interactive teaching materials that attract students' interest in learning. Modules are teaching materials made by educators with the aim of making it easier for students to learn learning materials independently (Zulhaini, 2016). With this, learning materials will always be able to be studied anywhere and anytime by students independently because they have instructions and are systematically designed without involving the teacher directly.

Based on the explanation of the problem, the author wants to raise research and develop relevant teaching materials in the form of modules by integrating technological developments, entitled "Development of Interactive Digital Modules to Improve Understanding of Material for Creating 3-Dimensional Applied Fine Art Works". Previous research also supports this research by showing the results of the effectiveness of products in the form of digital module learning media applied to learning with their respective problems. In research conducted by Rosari (2018) with the title "Development of Electronic Modules of Batik Motifs for Cultural Arts Subjects in the Aspects of High School Fine Arts". The study produced an electronic module entitled Insight material on Batik Motifs of the Archipelago using the 2013 curriculum with very good criteria. In addition, there is research by Fitri (2019) entitled "Development of E-Modules Assisted by Sigil Software on Relation and Function Material" which develops electronic module products on relation and function material that are feasible and effective for tools in mathematics learning activities.

Based on the analysis of needs and problems obtained, researchers conducted a study entitled "Development of Interactive Digital Modules to Increase Knowledge of 3-Dimensional Applied Fine Art Creation Material". With this research, it is hoped that it can make it easier for students to learn wherever and whenever and become a source of learning material for 3-dimensional applied fine arts using electronic devices. The objectives of this research are; 1) Analyzing the needs in developing interactive digital modules to improve understanding of the material for creating 3-dimensional applied fine art 2) Developing digital modules that are more innovative and interesting as teaching materials for learning 3-dimensional applied art creation materials. 3) Describe the results of the effectiveness test analysis of interactive digital modules on the learning outcomes of XII-E class students at Senior High School 1 Tumpang.

RESEARCH METHODS

This research uses research and development methods or known as R&D (Research & Development) is a research method used by researchers to produce certain products, and test how effective these products are (Sugiyono, 2013). Data analysis in qualitative is carried out based on real facts found in the field and then made into structural parts into hypotheses or theories so that the data obtained is in line with the actual data (Sugiyono, 2013). Meanwhile, quantitative data is a method used to answer and find out problems in research related to approaches and types of research, populations and samples, research instruments, and statistical programs (Nurdiana, 2020). Quantitative data is data obtained from results through quantitative analysis of tests that have been carried out in accordance with the instruments used (Prasetyo et al., 2024). Qualitative data is data obtained from field observations, interviews, and suggestions / input from expert validation.

This research and development model uses the 4D research model by Thiagarajan which stands for Define, Design, Development, and Disseminate. The 4D research and development model has a clear structure and makes it easier for researchers to create and develop new products. The following is the structure of the 4D research model.

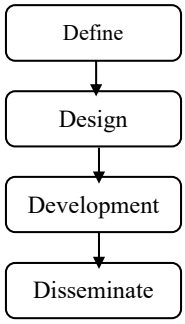

Figure 1. Model Structure

The 4D research and development model by Thiagarajan was used by researchers because it has a systematic procedure in producing learning material development products. The define stage is a stage where researchers can determine the problems obtained from field observations and interviews. At the design stage, this research produces a learning media product design in the form of an interactive digital module for the independent curriculum on the creation of fine art by adjusting the learning style and characteristics of students. At the develop stage, this stage needs to test the validity of the product after compiling based on the previous design to produce the final form through suggestions / feedback and determine the feasibility and quality of the product which is tested by experts as validators before being tested on users. The disseminate stage is a step in disseminating the resulting product to other users.

Qualitative and quantitative data analysis was used by researchers in this study. Quantitative data analysis is used for validation tests and product practicality tests using a Likert scale, while to test the effectiveness of the product using N-Gain (Normalized Gain). After analyzing the data using the validity formula, the value that has been obtained can be a reference for the feasibility of product trials by applying the following validity criteria.

Table 1. Learning Module Criteria

Criteria	Validity Level	Description
81% - 100%	Very Valid	Can be used without revision
61% - 80%	Valid Enough	Can be used with revision
41% - 60%	Less Valid	Not recommended for use
21% - 40%	Invalid	very unusable
0% - 20%	Highly Invalid	Cannot be used

(Source: Arikunto, 2016:89)

Meanwhile, to find out the data on the level of knowledge ability of students' learning outcomes, it is carried out by pre-test and post-test tests. After obtaining the results in the form of scores, the data collected is then processed using the N-Gain (Normaized Gain) data analysis formula as follows.

$$N - Gain = \frac{Posttest\ Score - Pretest\ Score}{Score\ Ideal - Pretest\ Score}\ x\ 100\%$$

The results of processing the data using the N-Gain formula were re-measured using the criteria for determining the level of effectiveness as indicated in the following table.

Table 2. Criteria for Determining the Level of Knowledge Effectiveness

Percentage	Description
$g \geq 0{,}7$	Effective High Category
$0{,}3 \leq g < 0{,}7$	Effective Medium Category
$g < 0{,}3$	Effective Low Category

(Source: Guntara, 2020)

RESULT AND DISCUSSION

Research and Development Result

Define

In the define stage, 5 steps were taken, which resulted in the conclusion of the problems, namely learning resources used by students only in the form of a summary of material in general without integrating technology, students of class XII-E have visual, auditory, and kinesthetic learning styles and are easily bored if learning is too monotonous, the curriculum used in compiling the module material for the creation of 3-dimensional applied art works is the independent curriculum, the tasks presented in the module must adjust the needs of students in achieving learning competencies, and the formulation of learning objectives in the material for creating 3-dimensional applied art works is adjusted to the learning outcomes that have been determined in the independent curriculum.

Design

The results and information found in field observations provide important insights as a basis and user needs, so that they are used as a reference in the initial design of interactive digital modules (Prasetyo, et al., 2024). The activities presented in the interactive digital module include a guide to using digital modules, 4 units of learning material, discussion activities, learning activities in the form of game-based quizzes, images and videos supporting learning material. The use of visual elements and adjusting to the needs of learners is designed to create an interesting learning experience and improve learner understanding. The following table shows the design of the digital module development.

Table 3. Product Design

Section	Description
The beginning of the module	Front cover, preface, table of contents, and general module guidelines
The beginning of the module	Discussion activities, unit 1, unit 2, unit 3, unit 4, unit 5, and learning activities
Module closing section	Summary, reflection, appendices, and back cover

Develop

The development stage aims to produce a product that is expected to be superior to the previous product (Wijaya et al., 2023). The validity test aims to produce the final form through suggestions / input and determine the feasibility and quality of the product tested by experts as validators before being tested on users. The following are the results of the analysis of material experts I and II in the form of graphs.

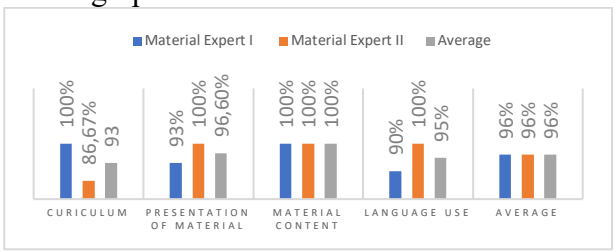

Figure 2. Results of Data Analysis of Material Validation Test I and II

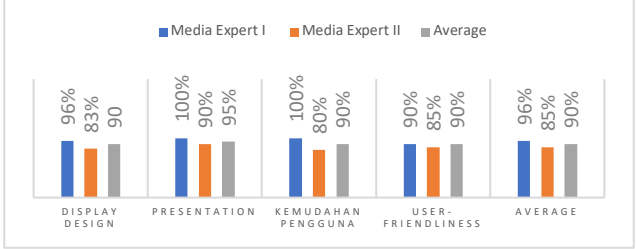

Figure 3. Results of Media Validation Test Data Analysis I and II

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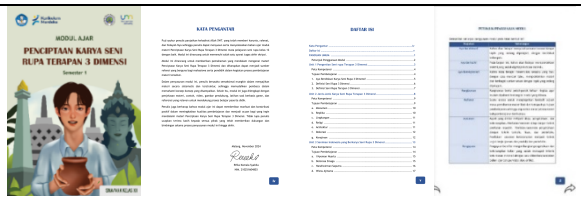
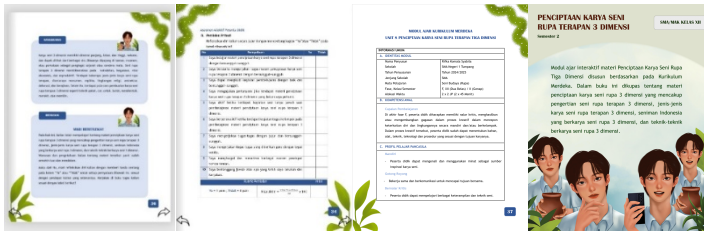
Based on the graph that has been presented, the total average of material experts I and II gets 96% very valid criteria. The total average of media experts I got 96% and media experts II got 85% with a total of 90% so that it got very valid criteria. To find out the practicality of interactive digital modules is done by distributing questionnaires to students. The following is a picture of the modified results after the material and media expert validation test.

Table 4. Product Modification Result

Section	Modified Result
Initial Section	
Core Parts	
Closing Section	

Based on the table above, researchers improved the product in accordance with the input and recommendations of material experts. Improvements that have been made as a form of product improvement so that the quality of the module is better. After revising the product, the next step is to carry out the practicality test of interactive digital module products on XII-E class students at Senior High School 1 Tumpang to find out how practical and effective a product has been developed. The following is a graph of the results of the analysis of the practicality and effectiveness of the interactive digital module material for the creation of 3-dimensional applied fine art works.

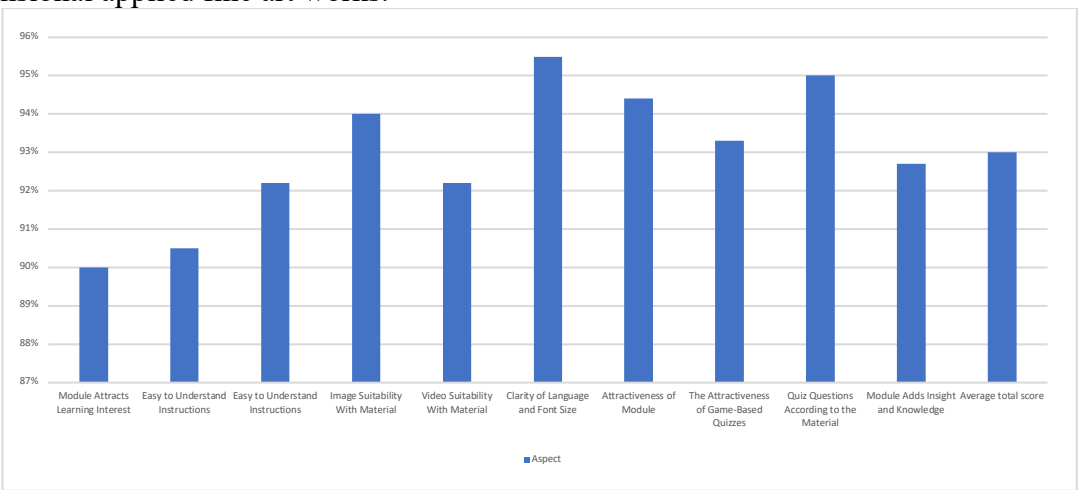


Fig. 4 *Practicality Test Data Analysis Results*

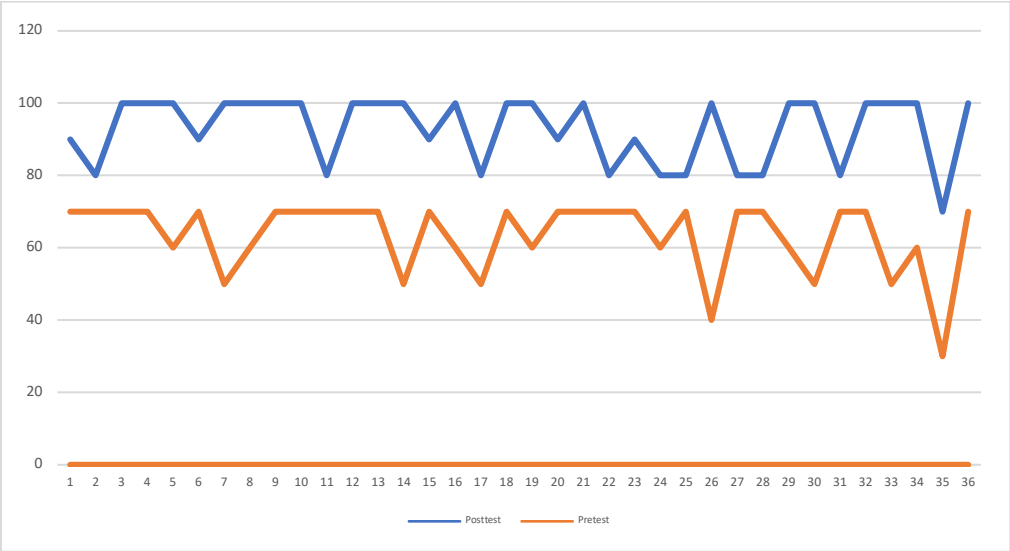


Figure 5. Results of Data Analysis of Effectiveness Test of Knowlegde

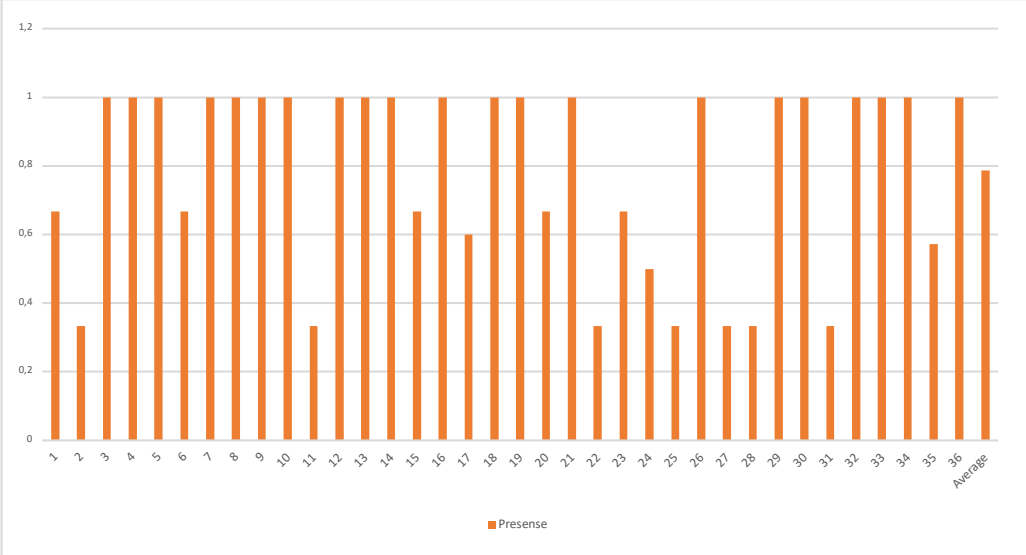


Figure 6. Results of Data Analysis of Knowledge Practicality Test

Based on the graph above, the average practicality test score obtained through 10 aspects tested on students obtained a score of 93% with very valid criteria. The graph of the results of the data analysis of the practicality test of students' knowledge of the material for creating 3-dimensional applied art works through the calculation of the N-Gain formula, it can be concluded that the average obtained is 0.787169 or 0.78. The criteria for the average score of 0.78 if adjusted to the table of criteria for determining the level of effectiveness of N-Gain g> 0.7 obtained high category effective criteria.

Disseminate

The dissemination stage is a step in disseminating products that have been developed to other users. the products developed in this study in the form of flipbook-based interactive digital teaching modules were disseminated by researchers on a limited basis, namely by distributing the final product to cultural arts teachers and XII-E class students at Senior High School 1 Tumpang.

Discussion

Interactive software, educational apps, and game-based learning approaches are some examples of innovations that can make education more interesting and relevant for students (Behnamnia et al., 2020). This study aims to develop an interactive digital module on the material of creating flipbook-based 3-dimensional fine art works as a product aimed at XII-E class students at Senior High School 1 Tumpang. The main purpose of the development of interactive digital modules is to improve the understanding of the material knowledge of the creation of 3-dimensional applied fine art works. Digital modules are defined as learning media used through computers that include text, images, graphics, audio, animation, and video (Marbun et al., 2022).

Digital modules also have efficient storage, unlike printed books that require a place or space to be stored and of course have a fairly heavy burden if carried anywhere, while digital modules only require a relatively small digital space. Thus, learning materials can always be studied anywhere and anytime by students independently because they have instructions and are systematically designed without involving the teacher directly. By using modules in learning activities, it is hoped that the learning process will be more effective and students can carry out practical activities independently (Mahardika, 2018).

The presentation of supporting images and videos in the module is expected to facilitate students' understanding and motivate and interest in learning to understand the concept of material quickly. Learners can add knowledge by learning additional information provided in the module in the form of presenting games so that students do not feel bored with the material and can increase student confidence (Satriawati, 2015). In addition, learning media in the form of modules that include images and allow students to interact directly and help students understand more effectively and remember learning material or information (Prasetyo et al., 2021).

Visual elements used in the module are the use of colors, font types, and illustrations. This module uses warm colors and is not too flashy to make users comfortable. Font is a complete combination of letters, numbers, symbols, or characters that have special sizes and characteristics (Nyoman, 2022). The use of 2 types of fonts chosen are Britannic Bold and Trubuchet MS. The presentation of illustrations used has been adapted to the material presented. This is based on the fact that illustration is a creative work in the form of images designed to describe but still maintain aesthetic value (Afrilianasari, 2014).

The total average of material experts I and II scored 96% so that it received very valid criteria. The 4 aspects tested on media experts are display design, presentation, user-friendliness, and language use. The total average obtained from the results of the validation test of media experts I and II is a total of 90% so that it gets very valid criteria. This interactive digital module was also tested for practicality by XII-E class students at Senior High School 1 Tumpang who obtained the results that the module criteria with an average score obtained through 10 aspects tested on students obtained a score of 93% with very valid criteria. In addition, this module also conducted an effectiveness test through pre-test and post-test activities aimed at XII-E class students by analyzing the results using the N-Gain (Normalized Gain) formula. The average score of the results of the effectiveness of understanding the knowledge of the material of the creation of 3-dimensional applied fine art works of the criteria of the average score of 0.78 if adjusted to the table of criteria for determining the level of effectiveness of N-Gain g> 0.7 obtaining high category effective criteria. The criteria that have been obtained indicate that the application of interactive digital modules to students is successful and proven to be practical and effective in providing a significant positive impact on the understanding of the knowledge of XII-E class students at Senior High School 1 Tumpang.

CONCLUSIONS

The development of flipbook-based interactive digital modules is a tool for learning resources in learning cultural arts (fine) aimed at XII-E class students at Senior High School 1 Tumpang.

The developed module aims to improve the understanding of students' knowledge on the material of the creation of 3-dimensional applied fine art works. The background of product development in the form of this module is the unavailability of interactive learning resources that can help improve students' understanding and interest in learning cultural arts learning. In the define stage, 5 steps were taken, which resulted in the conclusion of the problem, namely the learning resources used by students are only a summary of the material in general without integrating technology, class XII-E students have visual, auditory, and kinesthetic learning styles and are easily bored if learning is too monotonous, the curriculum used in compiling the module on the material for the creation of 3-dimensional applied fine art works is the independent curriculum, the tasks presented in the module must adjust the needs of students in achieving learning competencies, and the formulation of learning objectives on the material for the creation of 3-dimensional applied fine art works is adjusted to the learning outcomes set out in the independent curriculum.

The design stage produces a learning media product design in the form of an interactive digital module of the independent curriculum for the material of creating works of art by adjusting the learning style and characteristics of XII-E class students at Senior High School 1 Tumpang. This interactive digital module adapts to the defining stage, namely using technology in the form of online flipbooks. The activities presented in the interactive digital module include a guide to the use of digital modules, 4 learning units, discussion activities, learning activities in the form of game-based quizzes, images and videos supporting learning materials. The results obtained through the material and media expert validation test received a score of 96% and 90% with very valid criteria. There are also the results of the practicality test and the effectiveness test of the interactive digital module by obtaining a score of 93% with very practical criteria and 0.78 or 0.7 with high category effective criteria. These results show that the interactive digital module of 3-dimensional applied art creation material is successful in increasing the understanding of knowledge of XII-E class students at Senior High School 1 Tumpang.

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