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# Development of 'Website Cerdas' Media to Accommodate Differentiated Learning Styles of Batik Crafts Class XII Students

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**Abstract:** Class XII IPS 3 at SMAN 1 Pagak has diverse learning styles, including habits such as listening to music, playing games, and accessing social media. Batik craft material was chosen because this class has the lowest average scores compared to other classes, with teaching methods relying solely on textbooks and lacking the integration of technology based on the TPACK (Technological Pedagogical and Content Knowledge) approach. This study aims to identify initial needs, test the feasibility of the media, and evaluate the impact of a Website as a learning tool. The research employs quantitative and qualitative methods using Thiagarajan's 4D model, which consists of four stages: define, design, develop, and disseminate. Data collection techniques include observation, interviews, questionnaires, and pretest-posttest evaluations, analyzed using a Likert scale and N-gain effectiveness. The population consists of class XII IPS 3 students, with samples representing auditory, visual, and kinesthetic learning styles. Media expert validation results show a score of 86.6% (highly feasible), while material expert validation scores 87.5% (highly feasible). Small group trials score 84.8% (highly feasible), and large group trials achieve an N-Gain of 0.755 (highly effective), proving the Smart Website effectively improves understanding of batik craft materials among students.

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## Introduction

In learning fine arts about Batik craft in class XII IPS 3 SMAN 1 Pagak, students face difficulties in understanding the material presented. This obstacle is caused by variations in learning styles, some students understand better through oral explanations, others need visuals such as pictures or videos, and some learn more effectively with hands-on practice. However, time constraints often force teachers to generalize teaching methods, making the learning process less efficient and potentially causing learning loss or referring to a situation where students lose or experience a decline in the knowledge and skills they learn (Muzdalifa, 2022). As a result, students have difficulty achieving the target of batik-making practice as an end-of-semester achievement. In the other side, as a result for the average grade of fine arts in class XII IPS 3 is the lowest despite the smallest number of students.

The existence of complete facilities such as Wi-Fi connection and smartphone devices owned by every student does not always support the learning process. On the contrary, easy access to information and entertainment through these devices can distract students' focus. (Purwaningtyas et al., 2024). This makes students' concentration decrease and their attention is

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divided also they tend to be individualistic, focusing more on personal devices rather than interacting with teachers or friends and causing learning outcomes and literacy levels to decrease. To improve learning outcomes, it is important to utilize learning media and methods that suit the needs of students' learning styles (Simbolon & Harahap, 2022). The observation results show that teachers still rely on handbooks as the main source without utilizing modern interactive learning media. According to Prasetyo (2024), media is needed to convey things that are difficult to explain through text. Mrs. Alimah, the Cultural Arts teacher's, also stated that grade XII students have not received optimal media-based learning according to the TPACK (Technological Pedagogical Content Knowledge) principles. This problem is the main reason why the research was conducted at SMAN 1 Pagak.

In today's modern era, learning media that utilize virtual reality technology will create interesting learning and have high functional value (Iriaji et al., 2023). Learning media that is in line with the TPACK principle has a significant impact on improving the achievement of student learning outcomes (Maulida et al., 2024). This can be done by facilitating student understanding through an interactive approach that integrates various forms of media according to learner preferences. Complex learning material will be easily understood by learners if it is delivered according to their learning style (Collin Rose et al., 2002, in Sundayana, 2016). In addition, the use of technology allows flexibility in time and place, so that learners can learn anytime and anywhere (Sugiarto et al., 2023). Therefore, this is the main driver in strengthening the urgency of using technology-based learning media. In this context, the role of teachers is crucial in utilizing learning media to support the student learning process. According to Zahwa & Syafi'I (2022), learning media acts as a container to convey material, while material is the core of the learning message to be conveyed. Thus, it is important to produce learning media that is aligned with the needs of students' learning styles. In art learning media, the need for an approach that can support the absorption of art and design concepts visually and dynamically is very important (Iriaji et al., 2024).

The development of Website Cerdas media that accommodates learning style differentiation is essential. The name 'Website Cerdas' is taken from its ability to independently randomize questionnaires, calculate questionnaire results and an automation system to direct each student to materials with a form of learning style that has been prepared. Learning media can be categorized as interactive multimedia-based learning media if it includes text, images, animation, video and audio (Nugroho, 2016) . This statement is in line with research conducted by (Pratiwi et al., 2022) , the integration of digital-based multimedia in learning media allows students to be interested so that they can easily understand complex material content. Through the Website, teachers can convey the concept of batik craft in an interesting and interactive way using various multimedia formats (Palgunadi et al., 2022). This website also offers ease of access, allowing students to learn at any time as long as they are connected to the internet. With personal devices and Wi-Fi in every classroom, SMAN 1 Pagak students can use the Website to understand the material and prepare for the end of semester practical exam. The Website Cerdas integrates media like Canva, YouTube, and Artsteps to accommodate learning style differentiation. Batik craft materials in the Kurikulum Merdeka are organized into auditory, visual, and kinesthetic formats. The website also includes Akhmad Sugianto's research-based quiz (2021), automatically directing students to materials suited to their preferences.

Ary Purmadi and Herman Dwi Surjono's research (2016) in the Journal of Educational Technology Innovation is a previous research that developed a student learning style-based

  

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website to support Physics learning at SMAN 1 Sukamulia. The website provides learning style tests, teaching materials according to preferences (visual, auditory, kinesthetic), discussion forums, chat, and pretests and posttests. In addition, Ardianti's research in (2022) in the Journal of Educational Technology and Isti Nadia, Bobi Hidayat, and Sangidatus Sholihah's research in (2023) in the journal Edunomia, also tried to develop learning media products using the Website. However, the advantage of the Website Cerdas is an automatic feature that independently assesses students' questionnaire results and directly directs them to materials according to their learning style. This media development also supports the 21st century education paradigm by instilling 4C skills (critical thinking, communication, creativity, and collaboration) for efficient and relevant batik craft learning (Zubaidah, 2018).

The development of this media is based on the researcher's experience at school, where many teachers generalize students' learning styles. In addition, the results of interviews at three levels of education, namely Mrs. Kikis, 6th grade teacher at SDN 1 Sumberejo, Mr. Exsan, 8th grade teacher at SMPN 1 Donomulyo, and Mr. Edi, workshop teacher at SMAN 1 Pagak, revealed that each student has an indication of different learning styles. This condition shows that different learning styles are a challenge at various levels of education. Therefore, the research entitled "Development of Smart Website Media to Accommodate the Differentiation of Student Learning Styles in Batik Craft Class XII" aims to describe the initial analysis, the results of the media feasibility test, and the results of the media effectiveness test in developing a Smart Website that is able to accommodate variations in student learning styles in batik craft material. The quantitative approach is used to analyze the validation and effectiveness test of the media, while the qualitative approach processes criticisms and suggestions from observations and student responses. This website is designed to facilitate access to material through one link, hoping to improve efficiency and student learning outcomes as measured through the effectiveness test.

## Research Methods

Website-based media development for batik craft material for class XII SMAN 1 Pagak uses the 4D research and development (R&D) model by Thiagarajan, which includes four stages of defining (Define), designing (Design), developing (Develop), and disseminating (Disseminate) (Thiagajaran 1974, in Winaryati et al., 2021). This model is detailed so that the Website is not only pedagogically effective but also functional according to student needs. The following are the stages of the 4D model research that have been adjusted:

  

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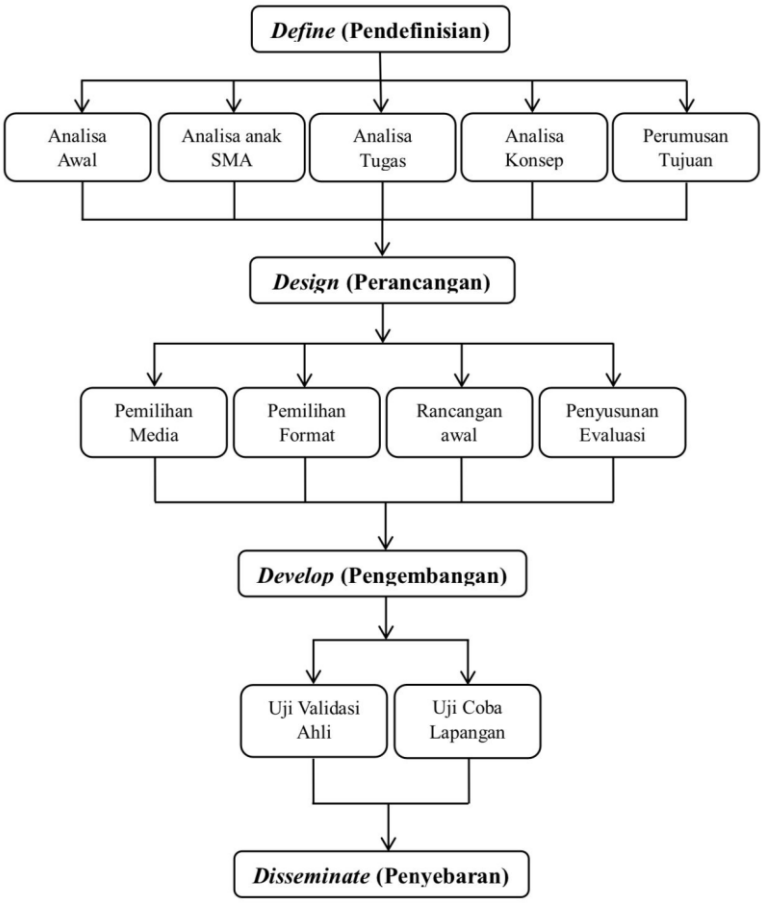


**Figure 1. Flow of 4D Research and Development Stages**
Source: Researcher Documents, (2024)

The development of website-based media for Batik craft material at SMAN 1 Pagak follows the 4D R&D model: Define, Design, Develop, and Disseminate. In the Define stage, issues such as low student interest and declining scores were analyzed, leading to the formulation of learning objectives that integrated the website with interactive media catering to auditory, visual, and kinesthetic learning styles. The Design stage involved selecting media, format, and creating an initial design, while the website incorporated tools like Quizizz for evaluation. During the Develop stage, the website was validated by experts and tested on students using pretests, posttests, and response questionnaires. In the Disseminate stage, after confirming feasibility, the website was limitedly disseminated for feedback before broader distribution to support students' learning styles.

The creation of this Website media product falls under the category of research and development (R&D), there are two types of data collected: qualitative and quantitative data. Qualitative data includes feedback from material and media experts, as well as responses from learners regarding the developed media. In contrast, quantitative data involves objective information obtained from questions and answers measured using a Likert scale to assess the quality and response to the learning media. For data collection techniques, several instruments are needed in the form of observation, interviews, questionnaires, and pretests and posttests. The following is a description of the data collection techniques needed: **(a) Observation** is

  

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done to find out how the Website can meet the learning needs in class XII IPS 3 SMAN 1 Pagak. Researchers observed the learning process, students' interaction with technology, and how the Website can support students' learning style differentiation. This observation aims to assess the implementation of the Website in the context of daily learning. **(b) Interviews** were conducted with one cultural arts teacher and two students. This interview aims to understand the views of teachers and learners about the presentation of materials through the Website as well as to obtain input and suggestions for improvement and adjustment of the Website to make it more effective in supporting learning. **(c) Questionnaires** were distributed to expert validators and a test group of 10 students of class XII SMAN 1 Pagak. This questionnaire consists of a checklist with a rating scale and a comments and suggestions section. The Likert scale was used to assess attitudes and perceptions towards the Website, with the data analyzed quantitatively to determine the extent to which the Website was accepted and effective. **(d) Pretest and Post-Test** were used to measure the effectiveness of the Website in improving students' understanding. The pretest was given before the use of the Website, and the posttest afterwards. The results of both were compared to assess the improvement of students' understanding. The pretest and posttest questions were presented in multiple choice format through the Quizizz platform to facilitate data collection and analysis. A total of 23 students participated in the study as the research sample in the XII IPS 3 class.

In this development research, quantitative data analysis was conducted using descriptive statistics on expert validation questionnaires and student response scores. The data were processed following the analysis formula outlined by Sugiyono (2013). Descriptive statistics were used to calculate average scores, percentages, and other relevant measures, allowing for an assessment of the website's validity and effectiveness. This analysis helped determine whether the website met the expected educational standards and whether it was well-received by students, providing insights for further improvements.

$$P = \left(\frac{\sum ς0}{\sum S\ Max}\right) \times 100\%$$

Description:
P = Average results in percentage form.
∑ς0 = Number of points for all answers.
∑S Max = Maximum number of points from all answers.
100% = Constant

The calculation results, presented as an average percentage, were analyzed and categorized into product feasibility groups, as shown in the following table:

**Table 1. Validity Test Eligibility Criteria**

| Validation Level Score | |
|---|---|
| 76% - 100% | Very Feasible |
| 51% - 75% | Worth |
| 26% - 50% | Less Feasible |
| 0% - 25% | Very Unfit |

Source: (Sugiyono, 2013)

Table 1, the percentage of results as follows: 0%-25% very inappropriate, 26%-50% less feasible, 51%-75% feasible, and 76%-100% very feasible. The effectiveness of Web-based

  

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learning media in improving students' understanding of batik craft material in class XII SMAN 1 Pagak was analyzed using pretest and posttest tests. The test data were processed using the Normalized Gain (N-Gain) formula, which is used to measure the level of improvement in student understanding after the use of learning media.

$$N\text{-}gain\ (g) = \frac{X2 - X1}{Xmaks - X1}$$

Description:
$X_1$ = Pretest score
$X_2$ = Posttest score
$X_{maks}$ = Maximum achievable score

The calculation results, expressed as numbers between 0 and 1, were analyzed and grouped based on the effectiveness criteria for the learning media. These criteria help evaluate how well the media performs in meeting educational objectives, as shown in the following table:

**Table 2. Normalized Gain or N-Gain Effectiveness Categories**

| N-Gain Index | Category |
|---|---|
| g < 0,3 | Ineffective |
| 0,3 ≤ g ≤ 0,7 | Medium |
| 0,7> | Highly Effective |

Table 2. describes the effectiveness categories based on the N-Gain index, where scores of 0.7 or higher are classified as very effective. This classification helps evaluate the overall success of the learning media by determining its impact on student learning outcomes. It also allows for the identification of specific areas that may need refinement or improvement. The results from this evaluation are essential for guiding future developments, ensuring that the learning media becomes more effective and better suited to achieving the educational goals. By analyzing these results, improvements can be made to enhance both the quality and the learning experience provided by the media.

## Results and Discussion

### Research and Development Results

Researchers adopted a structured procedure in designing Web-based learning media products. The development model applied is the 4D model, which includes the Define, Design, Develop, and Disseminate stages, which were first introduced by (Thiagajaran 1974, in Winaryati et al., 2021). The following is an explanation of the stages of developing Web-based learning media products according to the 4D model:

#### Define

The Define stage in this research includes five important steps to identify the needs and direction of the development of Website-based Batik craft learning media. **(1) Initial analysis** was conducted to understand the learning needs of Batik craft in class XII of SMAN 1 Pagak. Based on discussions with the Cultural Arts teacher, it is known that the lowest fine arts scores are in class XII IPS 3. Observation shows that learning still relies on the lecture method which is only effective for students with auditory learning styles. This encourages the need for learning strategies that can accommodate various learning styles of students. **(2) Analysis of student characteristics** was conducted through interviews. It was

  

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found that high school students experience significant fluctuations in emotional levels, which can affect their focus and engagement (Chintya Agung Mulyati & Ria Dewi Eryani, 2022). Additionally, many students lack motivation due to monotonous lecture methods and are often distracted by other activities, such as playing with cell phones. The characteristic of high school students being highly sensitive to technology makes web-based media a potential solution to attract their interest and improve their understanding of the material. **(3) Task analysis** emphasizes that the learning target is for students to develop the ability to practice batik making by the end of the semester. However, the main obstacle to achieving this target is the lack of understanding of the material, which hinders their progress. By using learning media that caters to students' individual learning styles, it is expected that they will be better prepared for the practical exam and improve their skill acquisition. **(4) Concept analysis** ensures the Website is developed in alignment with students' learning style preferences, whether auditory, visual, or kinesthetic. This media is designed to provide relevant materials tailored to students' needs, making it more effective in conveying the concept of batik craft. **(5) The formulation of learning objectives** aims to create engaging, interactive learning experiences that are aligned with students' preferred learning styles. This media is expected to increase student participation, enhance teaching methods, and make it easier for teachers to deliver the material effectively.

## Design

The design stage involves creating a conceptual framework for the Website product, which outlines the key features and elements that set the product apart from others. This framework serves as a blueprint, ensuring that all important aspects are considered, and helps in providing a clear understanding of the final product's structure and function. It highlights the unique features that make the website effective for its intended educational purpose. The following are the product specifications for the website media development:

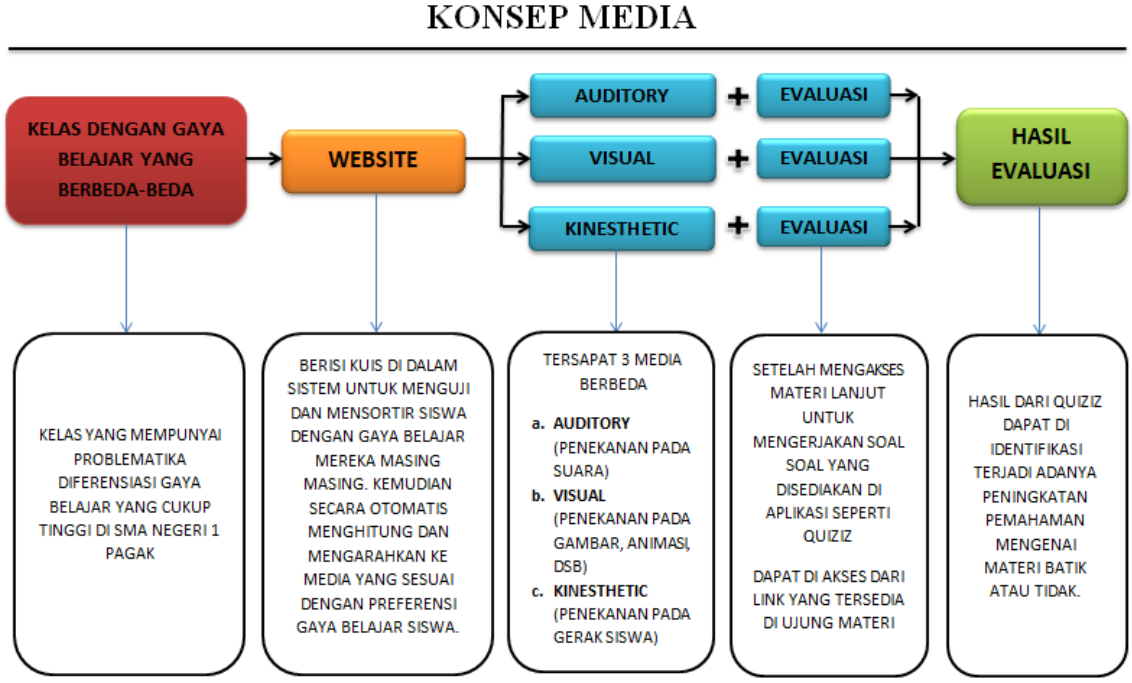


**Figure 2. 'Website Cerdas' Media Concept**

  

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Source: Personal Documents, (2024)

At the Design stage, researchers compiled a media concept framework as shown in Figure 2, which was then divided into four main steps, namely media selection, format selection, initial design, and evaluation preparation. The first stage **(1) Media Selection** involves choosing information technology-based media focused on the needs of XII IPS 3 students, who require a more interactive and accessible approach. Based on the analysis at the definition stage, a website was chosen due to its advantages in accessibility and flexible material presentation. This website is designed for online access, utilizing interactive features that support various learning styles, such as auditory, visual, and kinesthetic. By using the Website, students can access Batik materials based on their learning style preferences, which is expected to improve understanding and encourage more active engagement in learning.

The second stage, **(2)** Media presentation **format selection** focuses on the use of the Website as a smart platform equipped with algorithms to customize the material to each student's learning style. The website presents various content formats such as text, images, audio, video, and animation, which are customized according to students' preferences. The variety of formats is expected to deepen students' understanding, support various learning styles, and increase their engagement in the learning process. Through this approach, students are expected to access and understand the material more easily and be more actively involved in all learning activities.

The third stage, **(3) Initial Design,** focuses on preparing the basic concept of product development. This concept includes the structure of the material, interactive features, and presentation methods tailored to the needs of students' learning styles. In this design stage, there are two important parts, namely material design and media design. In **(a) material design,** researchers compiled teaching tools in the form of learning modules for Unit 2 on Grouping Applied Craftworks in accordance with the Class XII Fine Arts Teacher's Guide in the Merdeka Curriculum year 2022. (2022) especially in the Batik craft sub-chapter. This module serves as the basis for developing media content on the Website aimed at students of class XII IPS 3 at SMAN 1 Pagak. The following is the flow of presentation of batik craft material that will be presented:

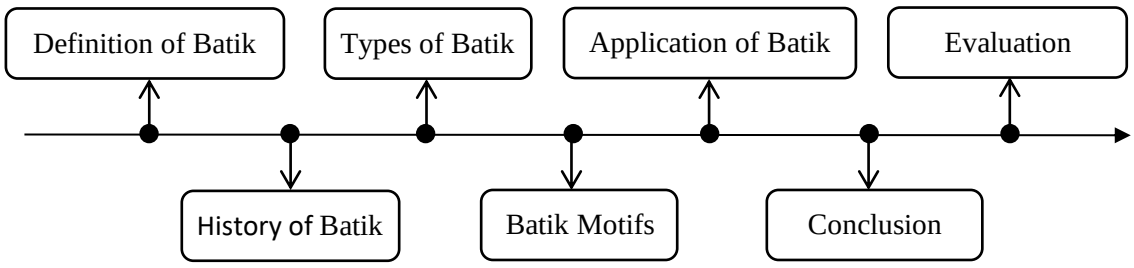


**Figure 3. Flow Chart of Presentation of Batik Craft Material**
Source: Personal Documents, (2024)

Figure 3. shows the flow of Batik craft material presentation. The understanding section explains the general concept of Batik. The history section covers the origin and development of Batik in Indonesia. In the types section, three popular types of Batik in Indonesia are explained. The batik application section describes how Batik is used in daily life. The batik

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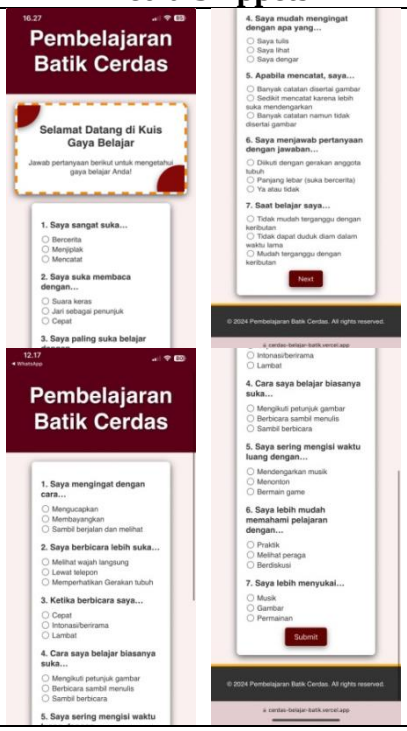
dynamics section discusses the perception of authentic Batik versus batik-patterned textiles. Finally, the conclusion and evaluation section includes a link to the Quizizz platform to measure students' understanding after learning Batik material through the Website media.

Then **(b) Media Design,** Website Design involves HTML, CSS, and JavaScript programming. HTML is used to form the basic structure of the Website, such as headings, paragraphs, and image elements. CSS organizes the visual appearance to make it more attractive, including coloring, fonts, and responsive layout. JavaScript adds automation features, such as calculating quiz results and directing students to materials based on learning styles. Once completed, the design was uploaded to hosting for public access. The website supports three learning styles: auditory materials through audio and discussion, visual materials with images, charts, and videos, and kinesthetic materials as physical activities, like study grounds involving movement. This approach ensures students can learn according to their preferences:

**Table 4. Prototype of Website Media Integrated with 3 Forms of Learning Style**

| Media | Media Snippets | Description |
|---|---|---|
| ***Website Cerdas*** |  | This 'Website Cerdas' serves to automatically sort and accommodate each student's learning style into the appropriate form of material. The website provides a 14-item questionnaire to identify each student's learning style which has been alpha tested by (Sugianto, 2021). The design of this website adapts to the age of XII grade students (17 18 years old), using Gill Sans font for a modern look and easy to read. Red circle accents and dotted lines in the header create a dynamic impression, with red and light pink colors as a classic and elegant background. Built with HTML, CSS, and JavaScript, this website allows responsiveness and automation of questionnaire analysis to direct students to materials according to their individual learning styles. |

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| | | |
|---|---|---|
| **Auditory Media** |  | Batik craft materials for auditory students are delivered through Canva with a voice-over explanation of the material, making it suitable to help them learn more effectively through hearing. The simple AiryFly font and dark green background are customized to create a calm and easy-to-read atmosphere, in accordance with the age of grade XII students (17-18 years old). The addition of interesting visual elements and instrumental music "Think About You" as a background is also added, to keep students focused and interested. So that students can focus maximally by relying on hearing. This design is made to increase the effectiveness of learning according to the needs of auditory students' learning styles. |
| **Visual Media** |  | Batik craft materials for visual learning style students are prepared using Canva, prioritizing visual elements such as illustrations, graphics, videos, and animations that are adapted to the age of grade XII students (17-18 years old). This is to help students who effectively learn with a visual style. The AiryFly font was chosen to give an attractive modern impression, with a blue background to create a fresh atmosphere. The presentation of the material uses images, infographics, as well as contrasting coloring such as red to highlight key points that make it easier for students to recall information. This approach is designed to strengthen students' understanding and increase their interest in learning batik craft materials. |
| **Kinesthetic Media** |  | Batik craft materials for students with kinesthetic learning styles are delivered through an online studio on the Artsteps platform, allowing students to interact directly with the materials according to kinesthetic learning styles. The minimalist design of the studio is tailored to the interests of grade XII students (17-18 years old). The studio is designed with shades of gray on the walls and marble-textured floor and roof, |

  

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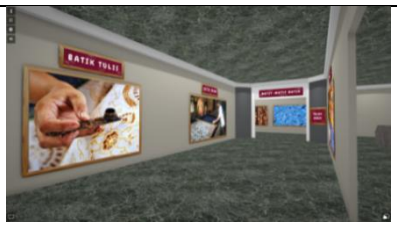
| | |
|---|---|
|  <br>  | creating an elegant, calm, and realistic atmosphere. The maroon material canvas from Canva adds a luxurious feel that harmonizes with the studio setting. The use of AiryFly fonts was chosen because it looks modern and easy to read, supporting attractive visuals while providing a more interesting and effective learning experience according to the needs of kinesthetic students. |

Table 4. shows the prototype website and presents batik craft materials according to three learning styles: auditory, visual, and kinesthetic. The website provides a quiz to sort students' learning styles, which is then directed to relevant learning media. Auditory media uses audio elements, visual media presents images and videos, while kinesthetic media offers an online studio for exploration. This approach aims to improve students' understanding according to their learning style.

The fourth stage in the Design stage is **(4) Preparation of Evaluation**, carried out through a post-test integrated in the website. The purpose of this evaluation is to measure how deeply learners understand the material. A total of 20 multiple-choice questions are presented through the Quiziz platform, which is designed to motivate students to think critically and increase the spirit of learning. By using Quiziz, this evaluation provides an interactive learning experience and allows students to get immediate feedback regarding their understanding of the Kriya batik material.

**Develop**

The development stage includes two main steps, namely expert appraisal and development testing. Expert appraisal aims to confirm the feasibility of product design through evaluation by experts, both in the field of material and media. Meanwhile, development testing is the stage of product testing on high school students. The results of the data obtained are quantitative data by filling in the learning media feasibility questionnaire and qualitative data by filling in criticisms and suggestions for product improvement.

**(1) The results of the material validation test**, conducted by two experts namely Denik Ristya Rini, S.Pd., M.Pd., a Lecturer in the Fine Arts Education Study Program at the Department of Art and Design, Faculty of Letters, State University of Malang, who tested as material expert I, and Alimah Wijayanti, S.Pd., a Class XII Cultural Arts teacher at SMAN 1 Pagak, who acted as material expert II. The validation sheet includes 20 questions that evaluate three aspects, namely the presentation of the material, then the content of the material, and also the evaluation. The following is a graph showing the average assessment of the two material experts.

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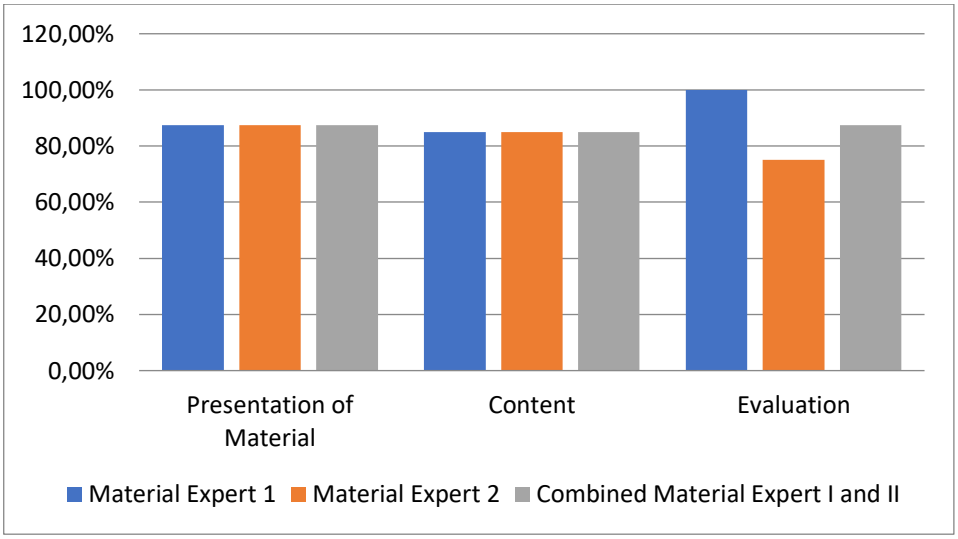


**Figure 4.Graph of Material Expert Validation Test Results I and II**
Source: Personal Documents, (2024)

Based on Graph 4, which shows the material validation test results from material experts I and II, there is no significant difference between the two. Both experts gave similar assessments of 87.40% for material presentation and content, classified as "very feasible," as well as 87.5% for evaluation, also in the "very feasible" category. The combined average score of 86.6% indicates that the product is considered "very feasible." Additionally, qualitative feedback and suggestions from both experts will be presented in the following table:

**Table 5. Criticisms and Suggestions of Material Experts I and II**

| Material Expert I | Material Expert II |
|---|---|
| **Aspect 1 (Presentation of Material)**<br>When opening the material, it should be clearly presented that each student gets batik craft material in what learning style. | **Aspect 1 (Presentation of Material)**<br>There are no criticisms and suggestions.. |
| **Aspect 2 (Content)**<br>Batik Print is not included in the type of batik, so it is omitted from the material, Add the source of ideas for creating batik motifs, add batik motif patterns, Batik printing is included in batik motif textiles. | **Aspect 2 (Content)**<br>It is recommended to add batik motifs and figurative patterns in the source of ideas for creating batik motifs. |
| **Aspect 3 (Evaluation)**<br>There are no criticisms and suggestions. | **Aspect 3 (Evaluation)**<br>There are no criticisms and suggestions. |

Table 5 displays feedback from material expert validators I and II on the development of batik materials. Material validator I suggested adding explanations to clarify which learning style each student receives batik material, removing printed batik from the batik type category, and including sources of ideas for creating batik motifs. Material validator II recommended adding batik motif patterns and figurative motifs in the source of ideas for creating batik.

  

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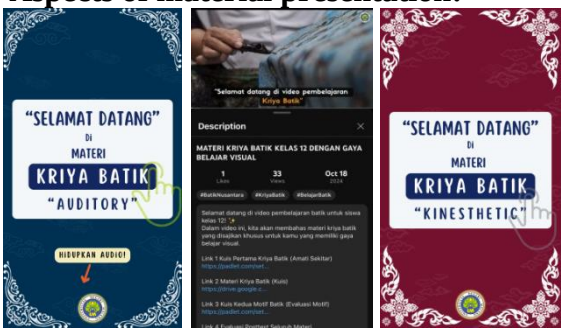
**Table 6. Results of Product Revisions by Material Experts I and II**

| Product Before Revision | Product After Revision |
|---|---|
| **Aspects of material presentation:**<br>  | **Aspects of material presentation:**<br>  |
| **Description:** Emphasizing the title of the batik craft material as students access each form of learning style obtained. | |
| **Content:**<br>**1. Definition**<br>**2. History**<br>**3. Types of Batik**<br>3.1. Batik Cap<br>3.2. Batik Tulis<br>3.3. Batik painting<br>3.4. Batik Print<br>**4. Batik Motif**<br>4.1. Definition of Batik Motif<br>4.2. Batik Motif Structure<br>4.3. Batik Motif Example<br>**5. Application of Batik in Daily Life**<br>5.1. Everyday Clothes<br>5.2. Work Uniform<br>5.3. Accessories and Embellishments<br>5.4. Special Events<br>5.5. Culture Preservation<br>5.6. Education and Creativity | **Content:**<br>**1. Definition**<br>**2. History**<br>**3. Types of Batik**<br>3.1. Batik Cap<br>3.2. Batik Tulis<br>3.3. Batik painting<br>**4. Batik Motif**<br>4.1. Definition of Batik Motif<br>4.2. Batik Motif Structure<br>4.3. Source of Idea for Batik Motif<br>4.4. Batik Motif Pattern<br>4.5. Batik Motif Example<br>**5. Application of Batik in Daily Life**<br>5.1. Everyday Clothes<br>5.2. Accessories and Embellishments<br>5.3. Special Events<br>**6. Batik Dynamics in Indonesia**<br>6.1. Definition of Original Batik and Batik Motif Textiles<br>6.2. Difference between Batik and Textile Batik Motifs |
| **Description:** The revision of the material content from the material expert validator includes several adjustments, namely the elimination of Batik Print in the type of batik, the addition of the source of ideas for creating batik motifs and batik motif patterns, and the classification of Batik Print into the category of batik-patterned textiles. | |

In Table 6, the revised 'Website Cerdas' based on the evaluation of two material expert validators includes several important adjustments. Revisions include affirmation of the title of batik craft material according to learning styles, deletion of information about printed batik that is not classified as original batik, addition of details on the source of ideas and

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patterns of batik motifs, and explanation of batik dynamics to distinguish patterned textiles from original batik.

The validation was conducted by Abdul Rahman Prasetyo, S.Pd., M.Pd., from Fine Arts Education and Muhammad Nurwiseso Wibisono, S.Kom., M.T., from Visual Communication Design, State University of Malang. The validation sheet consisted of 20 questions that assessed five aspects: media performance, interface design, layout, visuals, and navigation. The following graph shows the average assessment of the two experts:

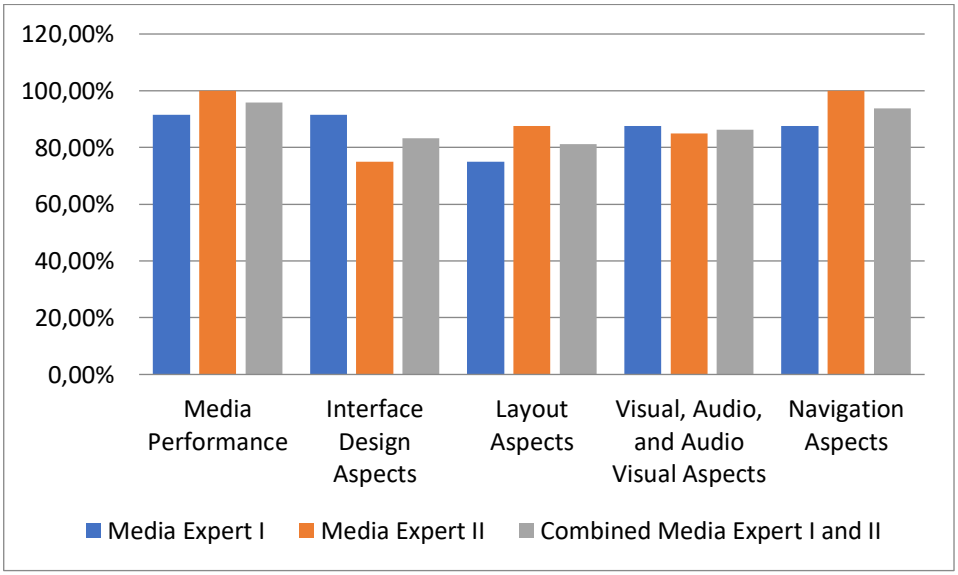


**Figure 5. Graph of Media Expert Validation Test Results I and II**
Source: Personal Documents, (2024)

Figure 5 shows the results of the Website media validation test by two experts, with almost similar results. In the media performance aspect, the average assessment reached 95.80% (very feasible). The interface design aspect scored 83.30% (very feasible), the layout aspect 81.25% (very feasible), the visual, audio, and audiovisual aspects 86.25% (very feasible), and the navigation aspect 93.75% (very feasible). The overall average assessment is 87.50%, which is classified as very feasible. Qualitative data analysis that includes feedback and suggestions from both experts is also included in the following table:

**Table 7: Critics and Suggestions of Media Experts I and II**

| Media Expert I | Media Expert II |
|---|---|
| **Aspect 1 (Media Performance)**<br>Performance for access to the Artsteps studio needs to be improved. | **Aspect 1 (Media Performance)**<br>Be careful in using the Website media because it requires sufficient bandwidth to access the media, including the Artsteps studio space. |
| **Aspect 2 (Interface Design)**<br>The color tones for the interface design are harmonized so that the moving media is not too pronounced | **Aspect 2 (Interface Design)**<br>It's Ok, but it's better if the media is given the UM logo as a watermark. |
| **Aspect 3 (Layout)** | **Aspect 3 (Layout)** |

  

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| | |
|---|---|
| There are no criticisms and suggestions. | There is writing that is too small, needs to be corrected. |
| **Aspect 4 (Visual, Audio, and Audio Visual)**<br>Using fonts in Website media that are easy to understand. | **Aspect 4 (Visual, Audio, and Audio Visual)**<br>There are no criticisms and suggestions. |
| **Aspect 5 (Navigation)**<br>The button and its function are clarified | **Aspect 5 (Navigation)**<br>There are no criticisms and suggestions. |

Table 7 summarizes the criticisms and suggestions from the two media validators. Validator I suggested improving access to the Artsteps studio, color consistency, using fonts that are easier to understand, and adding clearer navigation buttons. Validator II highlighted the importance of a stable internet connection, the addition of a UM logo watermark, and an increase in text size. Revisions based on this feedback are summarized in the following table:

**Table 8. Results of Product Revision by Media Experts I and II**

| Product Before Revision | Product After Revision |
|---|---|
|  |  |
| **Description:** To optimize access to the Artsteps studio, performance needed to be improved. One of the steps taken was to remove textures on the roof to reduce the processing load, allowing the platform to run more lightly and responsively. | |
| **Product Before Revision** | **Product After Revision** |
|  |  |
| **Description**: The addition of the UM logo as a watermark on the media which serves to visually strengthen the institutional identity**.** | |
| **Product Before Revision** | **Product After Revision** |

  

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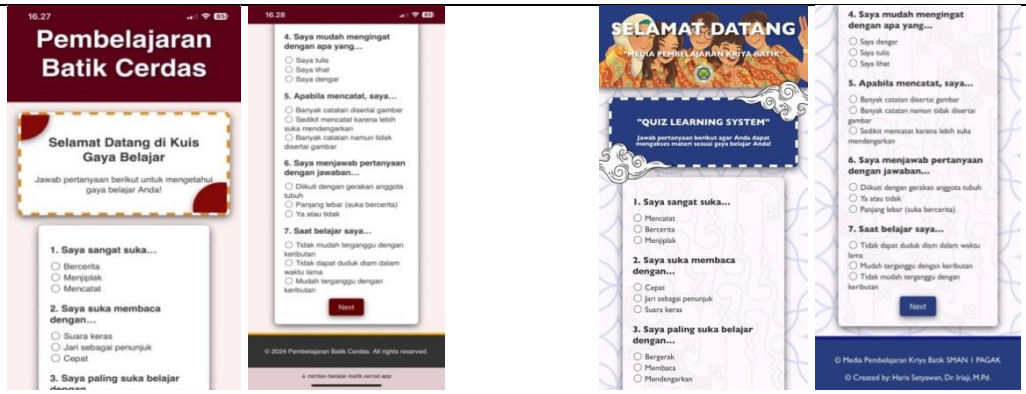
**Description:** Improvements to the writing in the media that is too small, so that it is easier for students to understand.

| Product Before Revision | Product After Revision |
|---|---|




**Description**: Using fonts in the Website media that are easy to understand. In addition, the color tones in the media interface design and the Website are adjusted to make the transition between media smoother and unobtrusive.

| Product Before Revision | Product After Revision |
|---|---|


**Description:** Addition of buttons and clarified function instructions.

Table 8. shows the results of the 'Website Cerdas' revision based on the assessment of two media expert validators. Revisions include improving the performance of Artsteps

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studio access, adding the UM logo as a watermark, adjusting interface colors, improving text size, using fonts that are easier to understand, and adding buttons with clear functions.

The visual media on batik craft material that previously used Canva was changed to YouTube videos to emphasize the visual aspect and facilitate access. This change was then revalidated by both validators to measure its feasibility, with a comparison before and after the change:

**Table 9. Visual Media Specific Development Storyboard From Canva To YouTube**

| Material | Duration | Music | Camera Angle | Media Before Revision | Video Media After Revision |
|---|---|---|---|---|---|
| Definition of Batik | 0.17-0.26 | Building Chemistry (Instrumental Version) | Eye Level |  |  |
| History of Batik | 0.27-0.43 | Building Chemistry (Instrumental Version) | High Angle |  |  |
| Types of Batik | 0.44-1.23 | Building Chemistry (Instrumental Version) | High Angle |  |  |
| Batik Motif | 1.24-4.33 | Building Chemistry (Instrumental Version) | High Angle |  |  |

  

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| | | | | | |
|---|---|---|---|---|---|
| Application of batik craft | 4.34-5.12 | Building Chemistry (Instrumental Version) | Eye Level |  |  |
| Batik Dynamics | 5.13-6.35 | Building Chemistry (Instrumental Version) | Eye Level | - |  |

Table 9. illustrates the storyboard for transforming the batik craft visuals from Canva into YouTube videos. The video angles are tailored to the content: eye level for explaining batik definitions and applications, and a high angle for discussing the history, types, and motifs of batik. The 6-minute and 35-second video is accompanied by an instrumental version of "Building Chemistry" as background music. After conversion, the media was revalidated by both media experts, who gave scores of 95.3% and 96.8%, respectively, with an average of 96.1%, which was deemed very suitable for use.

Furthermore, **(2)** the **Develop Testing Stage**, which is the media trial carried out on a small group of students, involving 10 students from class XII IPS 3 at SMAN 1 Pagak. At this stage, the students were assigned to answer a questionnaire containing their responses to the application of Website-based learning media. The following are the results of data analysis from filling out questionnaires that measure student responses to the use of 'Website Cerdas' learning media:

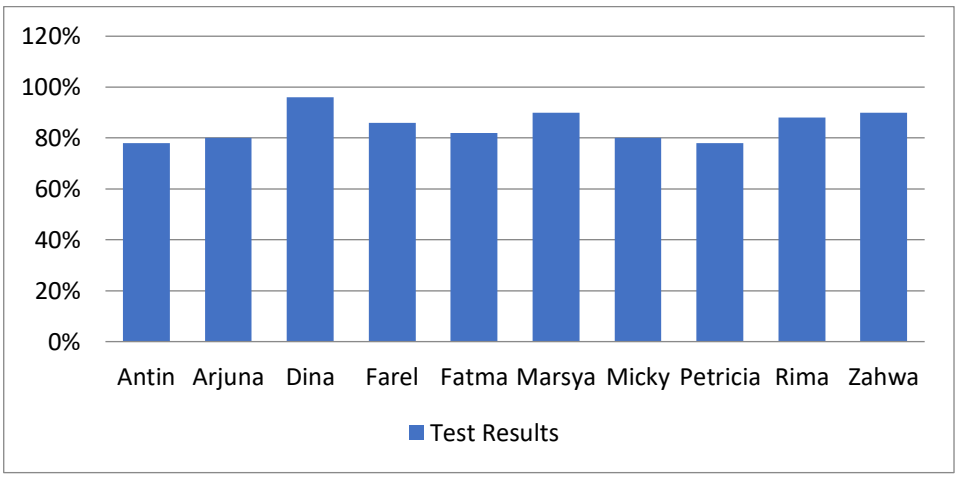


**Figure 6. Graph of the Results of Completing the Small Trial Student Questionnaire**
Source: Personal Documents, (2024)

  

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Graph 6. shows that the average assessment score in the small group evaluation reached 84.8%. With a maximum score of 50 per respondent, the total score was 424 out of 500. Some respondents, like Dina and Marsya, gave high ratings of 96% and 90%, reflecting a very positive response to the media. Based on this, the 'Website Cerdas' media is classified as very valid and suitable for use in learning.

**Disseminate**

At the Disseminate stage, measurements are taken to evaluate the effectiveness of the products that have been developed. This research uses an experimental design with one group given a pre-test and post-test in one class. The pre-test is given before the use of Website based learning media, and the post-test is given after the use of media to measure changes in student understanding. The following graph illustrates the difference in pre-test and post-test results after the application of Website media:

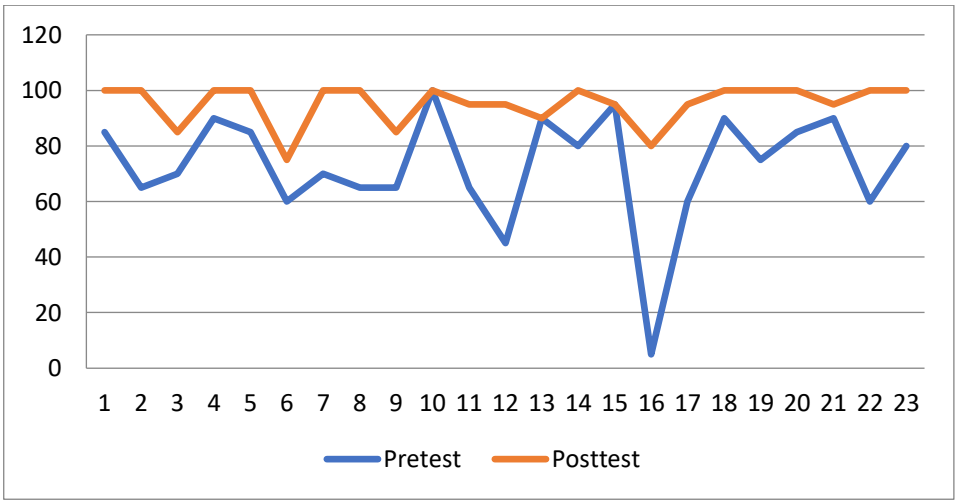
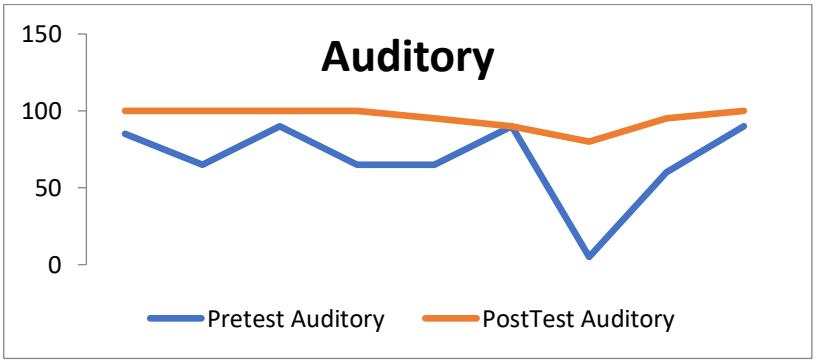



**Figure 7. Overall Pretest and Posttest Assessment Results**
Source: Personal Documents, (2024)

Figure 7. shows a comparison of pretest and posttest results, with scores that initially fluctuated in the pretest, but increased and stabilized after using the media. Based on the N Gain analysis, Auditory with a score of 0.835 (very effective) for 9 students, Visual with a score of 0.696 (medium) for 7 students, and Kinesthetic with a score of 0.711 (very effective) for 7 students. The following is a graphical presentation of the pretest and posttest results of all learning styles:



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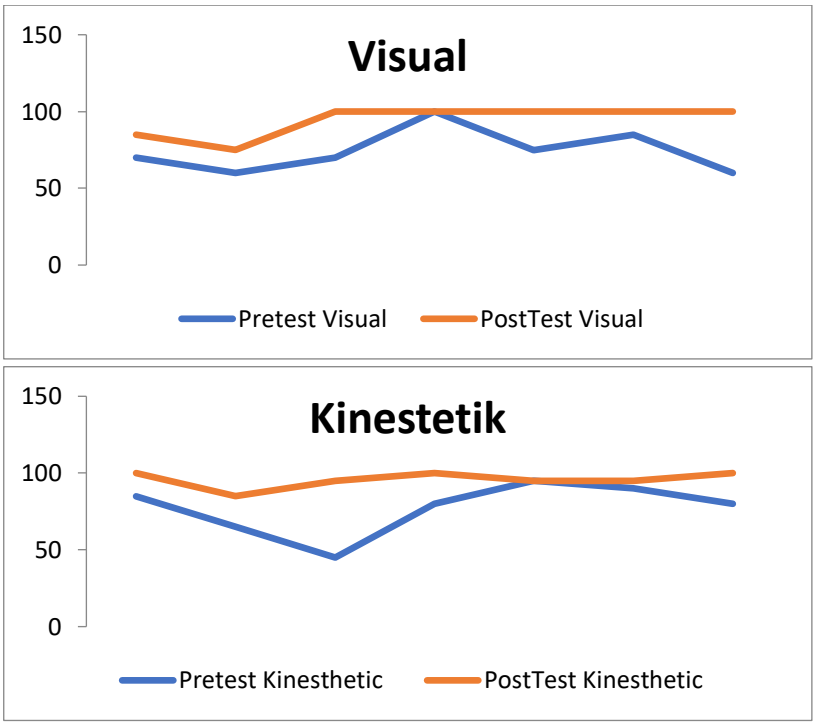


**Figure 8. Pretest and Posttest Assessment Results for All Learning Styles**
Source: Personal Documents, (2024)

Figure 8 shows that the overall average N-Gain value reached 0.755, which is classified as very effective. The use of media tailored to students' learning styles proved to have a positive impact, as seen from the significant increase in understanding. The results of this assessment also revealed that media tailored to auditory learning styles provided the most effective results compared to other learning styles. This confirms that the application of media that suits the needs of each student's learning style has a significant influence on student learning outcomes.

**Discussion**

The development of learning media website for batik craft material is intended for students of class XII IPS 3 at SMAN 1 Pagak. This website is designed to suit various learning styles of students in accordance with the concept of TPACK (Technological Pedagogical Content Knowledge), with the aim of deepening students' knowledge of batik craft materials. This website supports an in-depth learning experience, in accordance with the 21st century education paradigm, which includes the 4C skills of critical thinking, communication, creativity, and collaboration (Zubaidah, 2018). The condition of this paradigm is in line with research (Yuliana & Irawan, 2022), that implementing 4C Skills can help each learner to achieve optimal potential and develop important skills for future success. With technology, this website provides flexibility in terms of accessibility so that students can learn anytime and anywhere (Sugiarto et al., 2023).. This website combines text, images, audio, and video for flexible and comprehensive access to batik materials. This ‘Website Cerdas’ is an innovation from Ary Purmadi and Herman Dwi Surjono's research (2016). The difference is that this website has an automated system that assesses the results of students' questionnaires and directs them to materials according to their learning styles, namely auditory, visual, or kinesthetic.

  

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Auditory media emphasizes audio elements, such as narration and oral explanations, to help students understand information through hearing. This is in line with research conducted by Pahreza (2021) which shows that students with auditory learning styles more effectively absorb information conveyed verbally because they are more sensitive to sounds and words. Visual media, prioritizes visual elements such as images, videos, graphs, and charts. Visual students tend to find it easier to understand information presented in visual form, as they focus more on the graphical display (Razilu & Pangestu, 2022). Meanwhile, kinesthetic media emphasizes physical activity and motion in the learning process. Kinesthetic students are more effective at absorbing information when they are engaged in physical activity, as the movement supports comprehension and recall. This is in line with Andi Setiawan's book Learning and Learning (2017), which states that the kinesthetic learning style is an individual who is more effective in learning through movement. Thus, the use of media in accordance with each student's learning style can increase the effectiveness of learning.

The defining stage in this research involved five main steps to develop a Web-based learning media for batik craft materials. Initial analysis revealed that the lecture method at SMAN 1 Pagak was only effective for auditory learning style students, which resulted in low fine arts scores in class XII IPS 3. Variations in students' learning styles, such as the need for visual explanations or hands-on practice, hindered their understanding. Interviews showed that lectures lacked motivation, plus activity distractions such as playing cell phones, as well as emotional fluctuations in students that affected their learning focus (Ayusti, 2022). In addition, a lack of understanding of batik material is an obstacle in preparing for the practice of written batik. Therefore, this Website media was developed to adapt the delivery of material to students' learning styles, aiming to improve understanding and increase engagement in learning batik craft.

The design process of Web-based learning media is conducted through four main stages: media selection, format selection, initial design, and evaluation. The website was chosen because it supports the various learning styles of students in class XII IPS 3, namely auditory, visual, and kinesthetic. The media was designed to be flexible and interactive, allowing students to learn batik craft materials according to their preferences. Media formats include audio, video, images, graphics, animation, and online studio. In the design stage, modules from the Class XII Fine Arts Teacher's Handbook of Merdeka 2022 Curriculum were used as the basis of the material. HTML, CSS, and JavaScript technologies are applied, including an automatic quiz feature to identify students' learning styles. A Quizizz-based post-test is used to assess student understanding and provide immediate feedback. With this approach, the Website is expected to increase learning effectiveness and student engagement.

The development stage includes two main procedures: expert evaluation and student testing. Expert evaluation involved assessing the feasibility of the materials and media, including aspects of material presentation, content, and evaluation, as well as performance, interface design, layout, visuals, and media navigation. The validity test results showed that the material was very feasible, with some improvements, such as the removal of batik prints, the addition of batik motif patterns, and the affirmation of material titles according to learning styles. Media testing resulted in a very decent assessment, with suggestions for improvement such as access to the Artsteps studio, more readable fonts, and the addition of a watermark on the logo. Media revisions included improving performance, design, and text revamping, and changing visual media from Canva to YouTube videos to improve practicality and accessibility.

  

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At the deployment stage, an evaluation was conducted to measure the effectiveness of the product using an experimental design with a pre-test before the use of the media and a post-test afterwards. The results showed an increase in scores from pre-test to post-test. Based on the analysis, the auditory N-Gain score reached 0.835 (highly effective) for 9 students, visual 0.696 (moderate) for 7 students, and kinesthetic 0.711 (highly effective) for 7 students. Graph 3.7 shows an average N-Gain of 0.755, which is classified as very effective. Media that is tailored to students' learning styles has a positive impact, with auditory media being more effective than visual and kinesthetic styles.

## Conclusion

From this research, it can be concluded that 'Website Cerdas' media is effective in overcoming the problem of learning style differentiation that causes learning loss in students of class XII IPS 3 SMAN 1 Pagak, especially in understanding batik craft material. Website media developed with a Research and Development (RnD) approach using the 4D model succeeded in creating Website-based learning media that can accommodate auditory, visual, and kinesthetic learning styles, with an overall N-gain score of 0.75 which indicates very effective in the learning process.

## Recomendation

This study also found some limitations, such as the burden of using integrated media with Artsteps studio which causes access to be slow when the network is disrupted, as well as student confusion when switching between platforms. Therefore, future research is expected to pay more attention to the internet speed and the load of the media used and find a more efficient solution to reduce student confusion caused by media switching.

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