

Research article

Development of Educational Media About Natural Dyed Batik Based on Virtual Reality

Iriaji*, Abdul Rahman Prasetyo, Lisa Sidyawati

Universitas Negeri Malang, Indonesia

ORCIDIriaji: <https://orcid.org/0000-0002-8622-1423>**Abstract.**

Currently, natural dye batik is highly sought after at both the national and international levels. This is because natural dyed batik, besides having beautiful colors that tend to be soft, also carries health advantages: namely, the waste does not pollute the environment. Indonesian people, especially local tourists, are still not familiar with the uniqueness of natural dyed batik. Indonesian people tend to use synthetic dyed batik, which is actually made from chemical dyes that are not environmentally friendly. This research aimed to develop educational media about natural dyed batik based on the use of virtual reality to promote cultural tourism assets in the Trenggalek Regency. We used the Borg and Gall development model. Based on the stages of the Borg and Gall model, this research was simplified into the following steps: (1) research and data collection; (2) planning; (3) product draft development; (4) field trials; (5) product improvement based on the results of the field trials; (6) final product refinement; and (7) dissemination and implementation. In the first year of this development research, the focus was on the research and data collection, planning, and product draft development stages. Data were collected through interviews, observations, and document analysis. The data were analyzed using qualitative descriptive methods and content analysis of the product draft development design.

Keywords: virtual reality, tourism, batik

1. Introduction

Based on the survey results in the field, the potential for rice fields, dry fields/land, and extensive plantations makes Trenggalek Regency able to produce a variety of plants, including turmeric, mahogany trees, teak trees, noni trees, jolawe trees, tegeran trees, jambal trees, etc. so that the community can use the plant parts produced by these plants to make natural dye batik as one of the products that can be sold and move the wheels of the community's economy. The Trenggalek Regency government website also lists 16 batik industrial houses in the trade sub-sector, most of which craftsmen use natural materials in the production process. According to [1], natural dyed batik is batik in which dyes for textile materials result from extracts from plant parts such as roots, wood, leaves, seeds, or flowers.

Corresponding Author: Iriaji;
email: Iriaji.fs@um.ac.id**Published** 11 August 2022Publishing services provided by
Knowledge E

© Iriaji et al. This article is distributed under the terms of the [Creative Commons Attribution License](#), which permits unrestricted use and redistribution provided that the original author and source are credited.

Selection and Peer-review under the responsibility of the ICADECS Conference Committee.

OPEN ACCESS

Natural dye batik is currently on the rise in foreign countries, this product is in great demand because in addition to having beautiful colors that tend to be soft, the waste does not pollute the environment, but on the other hand, domestic people or local tourists are still not familiar with the uniqueness of natural dye batik, they are still choose to use batik that uses synthetic colors where the chemical dyes are classified as not environmentally friendly. Besides being harmful to humans, synthetic dyes can cause organisms in the water to die. Chemically, this is because the dye can change the value of biochemical oxygen demand (BOD) and chemical oxygen demand (COD) in water. In addition, the negative effect of chemical dyes in the coloring process for batik artisans is the risk of skin cancer. As a result, the skin of the hands that come into contact with harmful chemical dyes such as Naptol, which is commonly used in the batik industry which is included in the B3 category (dangerous toxic materials), can trigger skin cancer. From the disadvantages of using synthetic dyes that have been known above, one of the things we can do to reduce water pollution and pollution is to use natural dyes for batik production.

If understood in broad terms, [2] say that the media are human, material, or events that build conditions that enable students to acquire knowledge, skills, or attitudes. Media is used in teaching or education to become educational media or learning media. According to [3] teaching media are all tools and materials that can be used to achieve academic goals such as radio, television, books, newspapers, magazines, etc. According to Rossi, when used and programmed for education, tools such as radio and television are learning media.

[4] also suggests that learning media includes hardware (hardware) and software (software). Hardware is tools that can deliver messages such as overhead projectors, radios, televisions, etc. At the same time, the software itself is the program content that contains messages such as information contained in transparency or books and other printed materials, stories contained in films or material presented in the form of charts, graphs, diagrams, and so on.

Meanwhile, [5] states the benefits of media are: (1) teaching will attract more students' attention so that it can lead to motivation; (2) lesson materials will have a clearer meaning so that they can be better understood, teaching methods will be more varied; and (3) students will do more learning activities.

1.1. Natural Dye Batik

According to the material of origin, batik dyes are divided into 2, among others as follows: (1) Natural Dyes (Natural Dyes), namely dyes derived from natural materials in general from the results of plant extracts (roots, stems, leaves, fruits, skins). and flowers) and (2) Synthetic Dyes (ZPS), namely artificial or synthetic dyes made by chemical reactions with coal or petroleum charcoal as the basic ingredients, resulting from aromatic hydrocarbon derivative compounds such as benzene, naphthalene, and anthracene [6]. Natural dyes for textile materials are generally obtained from plants such as roots, wood, leaves, seeds, or flowers. Materials that can be used to manufacture natural dyes include the following [6].

According to [7], dyeing with mordant can be done in three ways, namely: Early mordant (pre-coloring/conditioning): dyeing the material, which is done by dipping the material with metal compounds and dyeing the material with dye. Simultaneous mordant (mono-chrome/metachrome): dyeing of materials carried out with a dye solution consisting of a dye and a mordant. Final mordant (fixation/after-chrome): first, immersing the material in the dye solution. After the dye is absorbed into the material, proceed with working the mordant with metal compounds. In addition to the three techniques above, it is also possible to use a mixed method of early mordant and middle mordant (giving mordant between two immersions).

1.2. Virtual Reality (VR)

Virtual reality is a term used to describe an artificial reality created for a specific purpose. The term virtual itself means something that has essence and impact but is not a fact. It means there is no limit to whether an object can be a virtual object as long as it is still within the scope of something that is not real. In contrast to virtual, reality has a more complex meaning, and reality has the meaning as a natural condition or quality, something that exists independently of ideas about that thing, and something that is a real thing as distinguished from something that is not or less. Clear. Simply put, the reality is a place or a natural object that we can feel. Based on the two notions of virtual and reality, it can be concluded that virtual reality is an artificial reality that is not real but can be felt and has a real impact [8].

2. METHOD

2.1. Research Approach

The research method for developing Natdye (Natural Dyeing) Trenggalek: Development of Virtual Reality-based Natural Color Batik Educational Media (VR) as a Promotion of Cultural Tourism Assets in Trenggalek Regency follows the Borg & Gall, development model. The reason for choosing the Borg and Gall development model is because the steps in this research are by the available time, funding, and the development concept that the researcher will carry out. Nana [9] explained that the Borg and Gall development model contained ten steps for implementing research and development strategies. In this research, it is simplified into seven steps considering the limited time of the study, so that it can be described as follows:

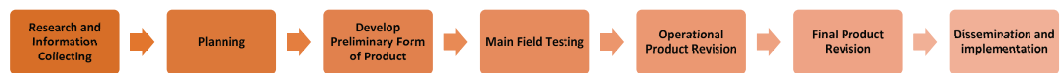


Figure 1: Adaptation and Modification of the Borg and Gall Development Model.

2.2. Development Research Procedure

2.2.1. Research and Information Collecting

At this stage, the researchers conducted initial observations regarding the problems of natural dye batik artisans in Trenggalek Regency to collect data to identify symptoms of problems with the availability of educational information and product promotion as a basis for selecting solutions to the issues faced.

2.2.2. Planning

At this stage, the researcher prepares the formulation of the problem, objectives, targets, and road map for the implementation of the research within 9 months and divides the tasks for each research team according to their competencies. In this stage, the researchers discussed choosing strategic steps in analyzing the data that had been obtained in the previous stage and strategic steps in developing the NATDYE (NATURAL DYEING) product TRENGGALEK: Natural Coloring Batik Educational Media based on Virtual Reality (VR).

2.2.3. Develop Preliminary Form of Product

At this stage, the activities carried out are: Create a product design for NATDYE (NATURAL DYEING) TRENGGALEK. Developing the NATDYE (NATURAL DYEING) design TRENGGALEK: Natural Coloring Batik Educational Media based on Virtual Reality (VR) in this stage, the application has been processed into a finished product that is ready to be tested. Prepare validation instruments to be filled out by expert validators and product trial instruments to be filled out by the public. Perform expert validation with media expert validators, namely visual communication designers and material content validators.

2.2.4. Main Field Testing

At this stage, the researchers conducted a trial by distributing NATDYE (NATURAL DYEING) TRENGGALEK: Natural Coloring Batik Education Media based on Virtual Reality (VR) via YouTube to the public. Besides that the researchers also gave a questionnaire to find out the effectiveness of NATDYE (NATURAL DYEING) TRENGGALEK: This Virtual Reality (VR)-based Natural Color Batik Educational Media works.

2.2.5. Operational Product Revision

At this stage, after questionnaires from the community were collected and inputs were analyzed in the form of weaknesses and strengths, the research team discussed the shortcomings that occurred to be used to improve the product. In addition, input from expert validators is also used as a basis for making product improvements. After that, the refinement results are validated again to the validator.

2.2.6. Final Product Revision

At this stage, the final input by the validator is refined to become a finished product and ready to use

2.2.7. Dissemination and implementation

At this stage, the researcher officially displays the NATDYE (NATURAL DYEING) TRENG-GALEK product: Educational Media for Natural Coloring Batik based on Virtual Reality (VR) on the website YouTube of the Trenggalek Regency Tourism and Culture Office.

3. DISCUSSION

Until now, researchers are still in the stage of data collection and planning where the results of these observations and interviews can be described as follows:

3.1. History

In 2009, Mr. Abdul Muid imagined that if he had retired from civil service in 2014 to seek additional income simultaneously, there would be positive activities. The initiator of the Rara Batik industrial house, is Mr. Abdul Mu'id himself and the owner of the rara batik. The number of artisans, 13 people help make batik from the batik rara industrial house. Developments: In 2009, the rara batik industry house used synthetic coloring. Still, when rara batik participated in the 2016 official exhibition, the buyers were more interested in natural dyed batik. Mr. Abdul Muid researched batik with natural dyes. The environment around Mr. Abdul Muid's house is also very supportive of materials from natural dyes, such as sawdust waste, tree bark, and leaves. From this research, the response from Pak Abdul Muid's natural dyed batik continues to increase. In 2017 Mr. Abdul muid ventured to participate in the exhibition independently. The following cities have participated in batik exhibitions: Balikpapan, Tanjung Selor KALTARA, Bandung, Jakarta, Semarang, Yogyakarta. Fans of batik with natural colors, rara batik, are very good at exhibitions. Many officials from the district head to the president are customers of batik rara. Upscale designers are also excited about batik products from Rara Batik. At the beginning of the 2020 pandemic, the rara batik industry house was not empty of customers. There was even an increase in orders from exclusive class customers because the owner of the rara batik began to reduce conventional sales strategies by offering via WhatsApp. In addition, offering prices below the price at the exhibition also makes customers from rara batik not hesitate to buy products from rara batik. In 2021, batik rara flooded with orders from government agencies in the district of Trengalek.

3.2. Typical Motifs

Mangosteen and clove motifs (mangkeh motifs) 2017 (East Java batik motif competition at the Department of Industry) Turonggo yakso motif since 2018, (3rd place in East Java level), Prahu motif (paradise motif on the south coast) 2018, Andini motif moon (moon orchid), natural motifs (coral, kili-kili beach). Batik rara natural dyeing technique, natural dye dyeing writing technique, and painting gradation colet writing technique. Tools and materials: canting, stove, etc. (same as batik tools in general). Material: Primisima Catton and Japanese cotton.

3.3. Natural Dyes

Yellow (jalawe, mango bark, mango leaves, wood tegeran) produces an excellent yellow color using mango bark and tegeran with a ratio of 1:2 fixation with alum. Brown color (mahogany bark, tingi bark, sengan tekik bark, ambu seed leaves, sapodilla leaves, fixation of alum. Color orange (tingi bark, sappan wood, tegeran wood in a ratio of 2:1:1) with alum fixation. Color maron red (tingi bark, jambal wood, sappan wood in a ratio of 1:1:2) with alum fixation, violet color (jambal bark, sappan wood in a ratio of 1:2 after fixation, dipped in one-dip indigo solution.

3.4. The Procedure of Dabbing and Dipping Natural Dyes

They start from scratching, inserting, making natural colors,/preparing colors as desired. Colet: natural dye 20 ns, 2 liters of water, boiled until 0.5 liters, let stand 1 hour so that it is filtered and ready to be applied. For colet requires two times stroke. Dip: 1 kg of dye, 15 liters of water, boiled until color appears, for example, high brown color appears, let stand for 1 hour, strain then the cloth that has been soaked or smeared is ready to be dipped. Rara Batik has a distinctive coloring technique in the production house, namely the combination dyeing process, and dyeing. Fixation using alum, tunjung, kapur.

3.5. Sales

From the beginning, it was founded until now. The rara batik industrial house continues to experience an increase in buyers. The segment of batik colet dyed rara batik products is middle and upper class, and most of them are customers with fixed salaries. Product buying and selling strategy (from the beginning, it was more conventional because Rara

Atik already had regular customers, so it was not difficult to market natural colored batik products).

Choose (upper-class buyers are more likely to order according to the desired motif, using a natural color dyed colet writing technique), pay a price that is appropriate to the difficulty, complexity and material), packaging using product packaging in the form of packaging bags. In addition to having a gallery to display the results of batik production, Rara also collaborates with the MSME gallery of BANK MANDIRI, local government agencies, government officials.

3.6. Results of Aerial View and Narrative Draft Product Planning



Initial Design	Information
	<p>Homepage slide in the form of the initial interface of Trenggalek batik with batik rara and UM logos. The navigation menu in the form of thumbnails is displayed in 3D menu with normal and VR mode display options with the help of VR BOX.</p>
	<p>The sinking room has a view of the boiling and thawing furnace at night.</p>

Table 1: Development of virtual reality on the website platform.

4. RESULT

Website design for learning media for natural dye batik Trenggalek was developed by considering the functions and structures that make it easier for visitors/visitors to shop or see the location to be visited. The interface is easy to understand, and the simple experience makes visitors feel pampered. A responsive website display is needed because website visitors are more likely to access information dynamically with various device characteristics.

Through the development of this website, it is hoped that it can become a marketing and information media for the public to know more closely about the stages of batik

work through real view media. In addition, the VR BOX feature with glasses also aims to facilitate the visitor's experience to learn to make natural dyed batik, such as at the batik studio location using a smartphone device.

This product needs updating and comes with VR video for some parts. The procedure for batik will be more effortless if it is in the form of a video and can be enjoyed in two features, namely offline and online mode. The structure of media distribution should be massive in the tourism and education sectors to generate the batik economy around the educational location.

Follow-up can be focused on developing VR videos and various batik-making techniques. Expansion in the marketing and branding of batik as a local wealth of Trenggalek Regency.

AcknowledgEMENT

PNBP UM fully funds the development of this website in 2021. All forms of products and outputs have been implemented and can be seen in the report's appendix. Thank you to the State University of Malang through the 2021 Research and Service Grant program.

References

- [1] E. Eskak and I. R. Salma, "KAJIAN PEMANFAATAN LIMBAH PERKEBUNAN UNTUK SUBSTITUSI BAHAN PEWARNA ALAMI BATIK," *J. Ind. Has. Perkeb.*, vol. 15, no. 2, Art. no. 2, Dec. 2020, doi: 10.33104/jihp.v15i2.6331.
- [2] T. Gerlach, "High fidelity audio-visual reproducing system," USD347837S, Jun. 14, 1994 Accessed: Jan. 18, 2021. [Online]. Available: <https://patents.google.com/patent/USD347837S/en>
- [3] S. Kallithraka, C. Garcia-Viguera, P. Bridle, and J. Bakker, "Survey of solvents for the extraction of grape seed phenolics," *Phytochem. Anal.*, vol. 6, no. 5, pp. 265–267, 1995, doi: 10.1002/pca.2800060509.
- [4] W. Sanjaya, "Perencanaan & desain sistem pembelajaran," *Jakarta. Kencana Prenadamedia Group*, 2008.
- [5] N. Sudjana, "Dasar-dasar proses belajar mengajar, Sinar Baru Algesindo, Bandung," 2002.
- [6] R. M. Kozłowski and M. Mackiewicz-Talarczyk, "Introduction to natural textile fibres," in *Handbook of Natural Fibres*, Elsevier Heilderberg, 2020, pp. 1–13.

- [7] R. Djufri, G. A. Kasoenarno, A. Salihima, and A. Lubis, “Teknologi pengelantangan, pencelupan dan pencapan,” *Bandung*, 1976.
- [8] W. R. Sherman and A. B. Craig, *Understanding virtual reality—Interface, application, and design*. San Franscisco: MIT Press, 2003.
- [9] N. S. Sukmadinata, 2019. “*Landasan psikologi proses pendidikan*,” Bandung: PT Remaja Rosdakarya.