



Development of Macramé Art Interactive Multimedia Learning on The Bag Product as an Innovative Learning and Teaching

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ABSTRACT

Macramé is a work of art that is made using rope ties through the creative process of aesthetic value into various products. Macramé art learning has a high level of complexity that requires interactive multimedia learning that can display the process of making knots and macramé products effectively, efficiently, and clearly. The method used in this research is Research and Development method. Development of interactive multimedia learning procedure is done through (1) analysis stages, (2) design stages, (3) development stages, (4) implementation stages, and (5) assessment stages. The validation result from the material expert has obtained a percentage of 91.55% that the interactive multimedia learning is considered valid/suitable for use as a media of macramé art learning on bag products. Validation of multimedia experts obtained a percentage of 95.3% that the interactive multimedia learning assessed valid/suitable for use as a learning media. The results of limited trials on the user obtained a percentage of 96,5% rated worthy to be used to support the process of learning macramé art on bag products. The results obtained show that this interactive learning media can be used as a model for the development of macrame art interactive learning media for bag products while still paying attention to the help button in using the media and the balance between back sound and narration. Recommendations for further research that can be carried out related to this research is to explore more on various materials and the addition of types of bags as macramé products and testing on students to review its effectiveness in the learning process.

Keywords: *Interactive Multimedia Learning, Macramé Arts, Bag.*

1. INTRODUCTION

Education in higher education is currently growing with various kinds of innovations in the learning methods used. One of the innovations that can be used in art learning is interactive learning multimedia. Macramé art as a branch of fine arts can be an interesting alternative for innovative learning for students in tertiary institutions. However, learning macramé art conventionally is still limited in terms of learning resources and media. Therefore, the development of macramé art interactive learning multimedia can be an innovative solution in art learning in tertiary institutions.

Interactive learning multimedia can combine various media such as text, images, video, animation, and sound to enrich student learning experiences. In addition,

interactive learning can also help accelerate understanding of concepts and increase student involvement in learning. Multimedia is media that integrates two or more media elements consisting of text, graphics, images, photos, video, audio, and animation.

Multimedia can be divided into two, namely linear multimedia and interactive multimedia. Interactive multimedia is multimedia that is equipped with a controller that can be operated by the user so that the user can choose what he wants for the next process. Interactive learning multimedia can be defined as a combination of various media that are packaged in an integrated and interactive manner to present certain learning messages. Interactive learning multimedia can stimulate thoughts, feelings, and a willingness to learn so that the learning process occurs deliberately is purposeful and is controlled.

Based on previous research, it was found that learning macramé art with video tutorials has drawbacks, namely learning tends to be passive because learning communication takes place in one direction, video images are unclear, limited to basic knot shapes, and there is no application to the product, whereas for the manufacture of macramé products a process from start to finish clearly [1]. Based on other preliminary studies, previous research has mostly examined the development of

learning media for macrame material at the elementary and high school levels [2][3][4][5]. In addition, several variations of learning media and craft learning methods were carried out in previous research [6][7][8][9]. This research position complements case studies at the higher education level and also focuses on interactive multimedia learning which provides opportunities for students to be able to carry out self-directed learning.

With the use of macramé art interactive learning multimedia, students can learn through simulations, experiments, and exercises. This will allow students to better understand the woven knot technique and create unique macramé designs. In this case, students will more easily understand the learning material and can develop their skills and creativity in the art of macramé. Thus, the development of macramé art interactive learning multimedia can be an interesting and effective innovative form of learning for students as well as supporting e-learning in tertiary institutions.

The art of macrame is very broad in its use in making functional products. Therefore, this research is limited to the development of interactive learning multimedia for macramé art in making bags. The purpose of this research is to develop interactive learning multimedia for macramé art in making bags as an effort to support innovative learning and e-learning in tertiary institutions with the following specific objectives: 1) Making interactive learning multimedia for macramé art that can improve students' understanding and skills in making bags with knot woven techniques, and 2) Identify interactive learning multimedia features that can increase the effectiveness of learning the art of macramé in making bags.

Learning multimedia can be interpreted as a multimedia application that is used in the learning process, in other words, to convey messages (knowledge, skills, and attitudes) and can stimulate students' choices, feelings, attention, and willingness, so that the learning process occurs deliberately, purposefully and under control [10]. Interactive learning multimedia has a number of advantages as follows: 1) Flexible, both in giving the opportunity to choose the lessons presented, as well as variations and placements to be accessed, individually or in groups, and flexible in time 2) Self-pacing, which is catering to individual learning speed, meaning that the speed at which it is used depends on the ability and

readiness of each student who uses it. 3) Content-rich, which is rich in content, meaning that this program provides quite a lot of information 4) Explain learning material or objects that are abstract (not real) to be concrete (real), because they can be seen, felt, or touched. 5) Studying learning material repeatedly [12]. Attract the attention of students, thereby generating interest, motivation, activity, and learning creativity. 7) Learning material is remembered longer and is easy to rephrase quickly and precisely, 8) It makes it easier and faster for educators to present learning material in the learning process, making it easier for students to understand and understand it.

Interactive Learning Multimedia has characteristics such as: 1) It has more than one convergent media, for example combining audio and visual elements, 2) It is interactive and has the ability to accommodate user responses. 3) Is independent, provides convenience and completeness of content so that users can use it without the guidance of others. In addition to fulfilling these three characteristics, learning multimedia should fulfill the following functions: 1) Able to strengthen user responses as quickly and as often as possible, 2) Able to provide opportunities for students to control their own pace of learning. 3) Pay attention that students follow a sequence that is coherent and controlled. 4) Being able to provide opportunities for participation from users in the form of responses, whether in the form of answers, elections, decisions, trials, and others

1.1. Macrame and Knots

Macramé is a work of art because it is made through a creative and imaginative human process by making rope ties into various knots and various products that have aesthetic value. Macramé art is the result of a craft with a knotting technique using thread or rope [11]. Macramé is an art of tying or braiding perfected by the Arabs in the early 7th century AD. Like a net, macramé consists of several long strands of rope woven vertically or horizontally. The word macramé comes from the Arabic *migramah*, which means edge or edge, and this technique was originally used to make fringe decorations on towels. In the 8th century AD, a colonist named Moors brought this knowledge of macramé to Spain, and it spread to France and Italy.

Over time, the art of tying or tying this rope has also kept up with existing developments. In the 1970s objects produced using the macramé technique were not limited to nets and nets but developed into something that is used by humans, such as hats, gloves, socks, bags, and many other products [12]. As is well known, the macramé or rigging technique can be used to make an object that is infinitely wide, because from the basic knotted rope by repeating and combining several types of techniques, patterns can be formed which have infinite possibilities.

The macramé technique has a form of ties and knots that have existed since the Victorian era.

The macramé knot variation is a development of the basic macramé knot. There are 4 basic types of knots [13], including half knots, half double knots, single knots, and flat knots, as well as 2 completion knots, namely tassels and pigtails. In addition, Saraswati revealed that there are 3 main types of knots, namely flat knots, chord knots, and anchor knots [14]. Meanwhile, Cornerstone states that there are 7 types of knots and their variations, including the square knot, overhead knot, half knot, half hitch, double, half hitch, Josephine, and larks head knot [16].

Based on the description above, the authors conclude that there are 5 basic macramé knots, namely the anchor knot (larks head knot), flat knot (square knot), double half hitch knot, half knot, and completion knot (finishing knot). In addition, there are decorative knots. Various variations of knots can be created from basic knots. These knot variations are usually used to make products such as accessories, wall hangings, vase hangers, and bags. In the bag itself, it is recommended to use a unique variation of the knot, not excessive, and looks beautiful and attractive. Here are five basic types of knots and their variations that can be used to make bag products.

1.2.1 Larks Head Knot

The larks head knot or also called the anchor knot is a knot that is usually used as a start in making macramé products [17]. On a bag, for example, this knot is usually used as a start which is attached to the handle of the bag. There are 2 variations of head knots (see Figure 1-4) that can be used to make a product, including interlocking larks head knots and larks head chains.

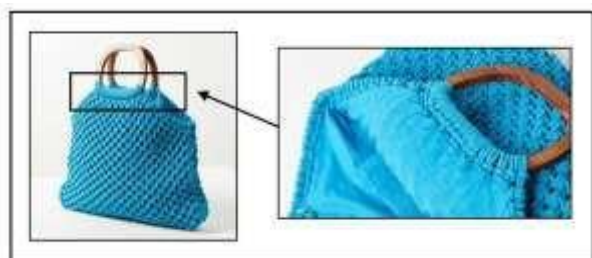


Figure 1. Larks head knot applied on Macramé Bag
Source: www.urbanoutfitters.com

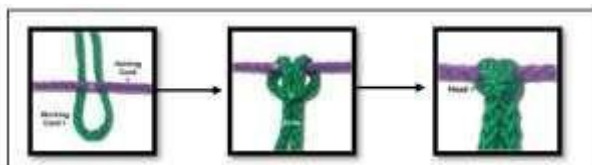


Figure 2. Larks head knot making technique
Source: free-macramé-attearn.comp

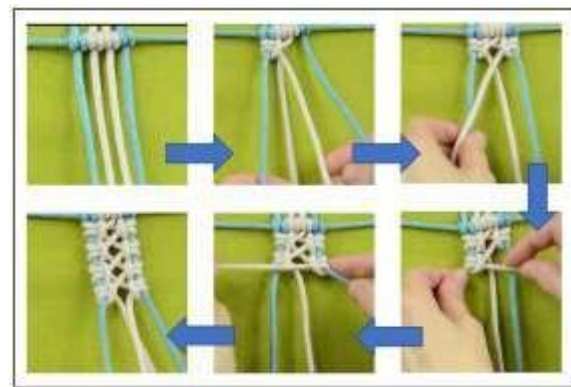


Figure 3. Interlocking larks head knot making technique

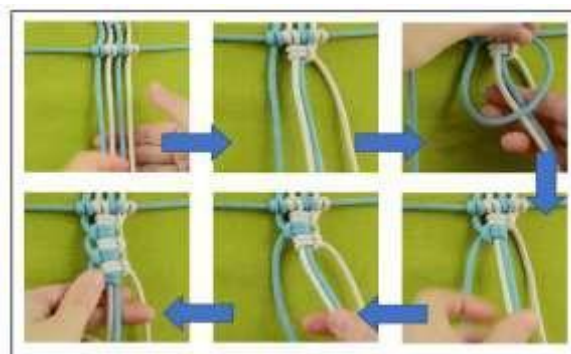


Figure 4. Lark shead chain knot making technique

1.2.2 Square Knot

The square knot is a knot that is often used in making macramé products. This knot is formed from 2 or more ropes known as knotting cords and has 1 or more ropes at the center known as filler ropes. There are many variations and patterns that can be made using just a flat knot on its own or in combination with other knots. Just like in the head knot, in the flat knot there is also a head knot whose position must be considered so that the knot is formed correctly. There are 2 heads in the flat knot, namely the right head and the left head

1.2.2.1. Interlocking Square Knot

Interlocking Square Knot or also called a flat knot with a jump [18]. Variations of this knot are usually used in macramé products in the form of wall hangings, clothing and bags. The bag itself is usually used on the front and back (see Figure 5-6).



Figure 5. Making Interlocking Square Knot

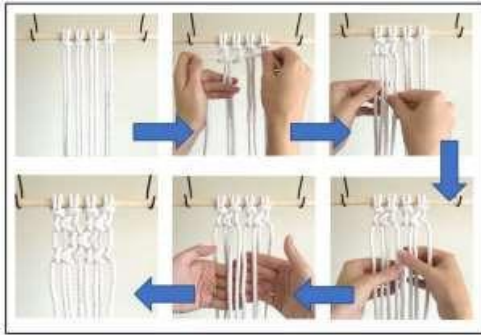


Figure 6. Interlocking square knot-making technique

1.2.2.2. Square Knot Chain

Square Knot Chain is also called square knot sennit in the form of a bar or elongated rod like a chain. There are many forms of flat knots in the chain, depending on the variety of shapes desired. This knot is usually used to make accessories such as bracelets, necklaces, and belts. This knot is also usually used on the shoulder strap (see Figure 7, and Figure 8 for the technique).

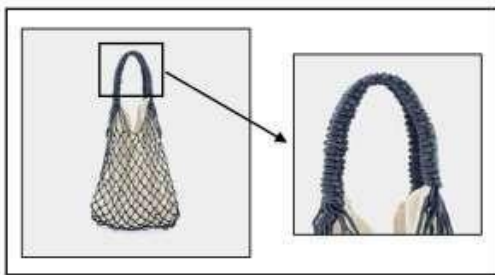


Figure 7. Square Knot Chain on bag

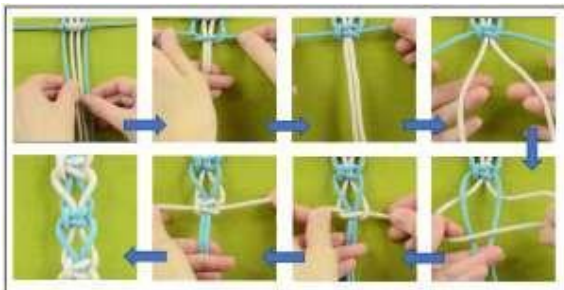


Figure 8. Square Knot Chain technique

1.2.2.3. Picot Flat Knot

The picot flat knot is a classic macramé knot often used in the early and mid-1900s. The picot is the small hole that runs along the edge of the knot. This knot is usually used as a decoration and makes macramé products look more feminine. There are 3 types of picot knots based on the position of the picot itself, including picot flat knots (see Figure 9 and Figure 10 for the technique), one-sided picot flat knots, and top picot knots.

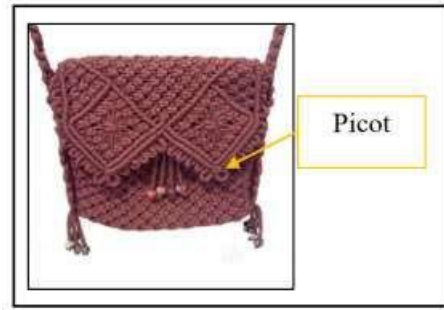


Figure 9. Picot knots applied on bag macrame

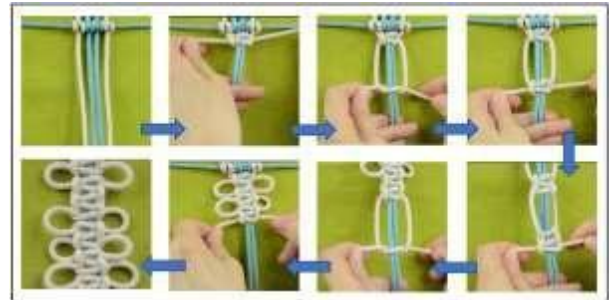


Figure 10. Picot knots-making technique

1.2.3 Double Half Knot

The half-double knot or cordon knot is nothing more than a simple loop that wraps around the second rope [19]. This knot is very important because most macramé patterns usually use this knot as the main knot. This knot is formed from a single knot as a knotting cord which is strung continuously on one or more filler ropes to form a bar or row (see Figure 11). This bar can be formed in various directions and even form something complicated (see Figure 12).



Figure 11. Double Half Hitch knot applied on bag

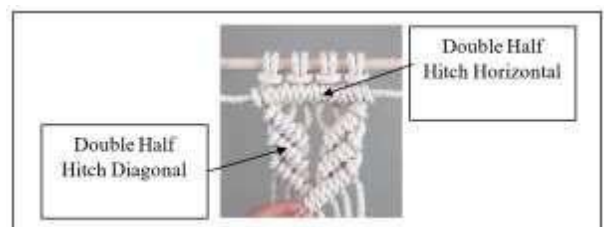


Figure 12. Variation Of Double Half

1.2.4 Half Knot

A half knot, also known as a spiral knot (see **Figure 13**), is a square knot that is tied only once from one side (only on the left or right) so that if it is knotted repeatedly, it will form a twist [20]. This knot is often used in macramé patterns both past and present. This knot is also often used as a decorative knot on various kinds of macramé products, ranging from vase hangers, jewelry, and even bags. See **Figure 14** and **Figure 15** for the variants.

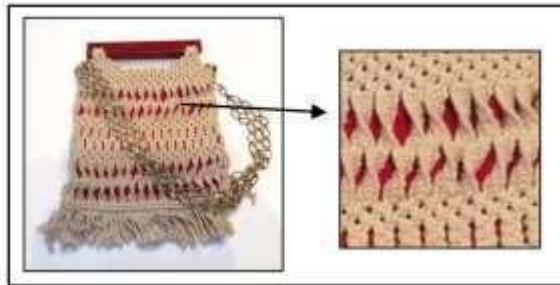


Figure 13. Half knot twist on bag product

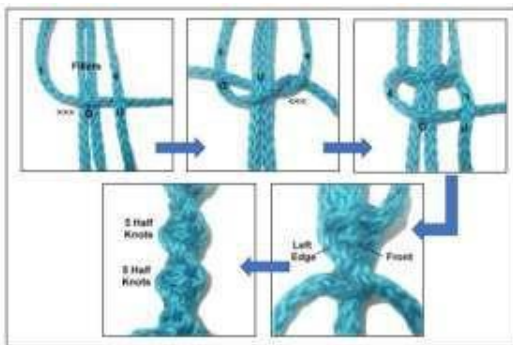


Figure 14. Single Spiral

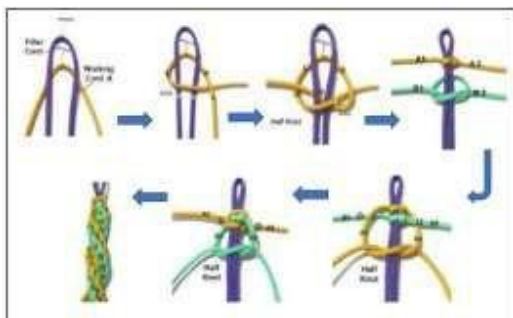


Figure 15. Double spiral

1.2.5 Finishing Knots

Finishing knots (see **Figure 16**) are used at the end of a macramé project, one of the knots included in finishing knots are tufts and tassels. The following is a variation or development of a finishing knot that can be used on a project or product, especially bags.

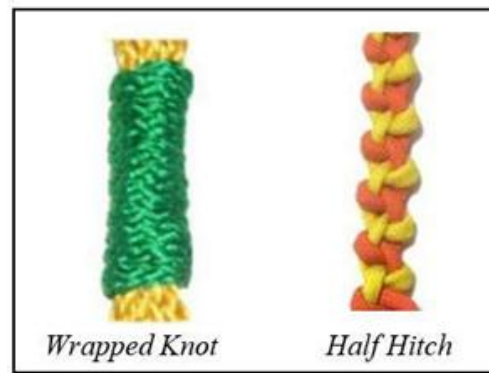


Figure 16. Finishing Knot

1.2.6 Decorative Knots

A decorative knot is a knot used as a decoration for a macramé product. The decorative knot that will be explained is Macramé Flower (see **Figure 17**). This decorative knot is a unique and interesting knot and is often used in macramé products. In the bag product itself, macramé flowers are usually applied as decoration on the face.



Figure 17. Macrame Flower

1.3. Making Bag Process

1.3.1 Design/Sketch Making

This stage is the initial stage of product creation. At this stage analysis and research is carried out on the product to be made, then the results of the research are realized in the form of drawings in the form of sketches or illustrative designs accompanied by descriptions of sizes, details of variations, and accentuations on bag products (see **Figure 18**). The following is a bag product design that will be made.

of knots that can form a motif that has functional and aesthetic value.

The following are some of the developments made in the interactive learning multimedia process, namely: 1) The material presented in multimedia is made more detailed in the variety of nodes and the process of making products, 2) Multimedia is designed to be more interactive, and visually aesthetic with more communicative navigation buttons, effectively, and efficiently so that students can easily operate multimedia properly from start to finish. 3) Interactive multimedia 360 degrees spinning image which can be a clearer and easier visualization of macramé products for students to understand.

3.1.2 Software Analysis

The process of developing interactive learning multimedia for macramé art requires software, including the following. 1) Adobe Flash Professional. Adobe Flash is a program specifically designed by Adobe and a professional standard authoring tool application program that is used to create very attractive animations and bitmaps for the purposes of developing interactive and dynamic websites. 2) CoreDRAW. CoreDRAW is a vector graphics editor software that is used to create icons, objects, and images and is used to design layouts and navigation buttons in interactive learning multimedia. CoreDRAW has a simple and easy-to-use or user-friendly interface. 3) Luma Fusion. Luma Fusion is an iOS-based application that functions as a video and audio editor. Luma Fusion is used to edit tutorial videos along with their backgrounds and narrations in interactive learning multimedia. Luma Fusion has almost the same capabilities as Windows or Mac-based software, so it's very good to use.

3.1.3 Hardware Analysis

Learning media needs to be supported by the use of several hardware devices in its production, including the following: 1) Camera, 2) Laptop/PC, 3) Tablet/Tab, and 4) DVD.

3.2. Design

The design stage is the elaboration stage of the concept that is more specific to the multimedia development that has been designed. The concepts and themes designed must be in accordance with the material discussed in multimedia, such as the selection of content concepts, views, backgrounds, backgrounds, colors, and animations. Making macramé art learning multimedia for bag products includes the preparation of macramé materials, storylines, storyboards, narrations, and validation formats. The design can be described as follows.

3.2.1 Storyline

Storyline provides a detailed description of each scene to make it easier for programmers and editors in the shooting process and multimedia production in a systematic and orderly manner.

3.2.2 Storyboard

A storyboard is a description in the form of media components that will be used in each scene. The storyboard functions as a guide and guide for programmers and editors in realizing multimedia so that it is in accordance with the intended design.

3.2.3 Navigation Button

Navigation buttons are designed starting from the shape, color selection, and animation effects so that the multimedia becomes more alive. The design of the navigation buttons is made using CoreDRAW. See **Figure 21** to see the navigation button design.

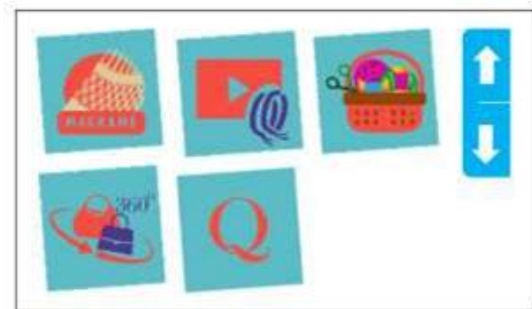


Figure 21. Navigation Button Design

3.2.4 Multimedia layout

After the navigation button design is made, the next step is to make a layout design for interactive multimedia development. **Figure 22** below shows the layout of multimedia.

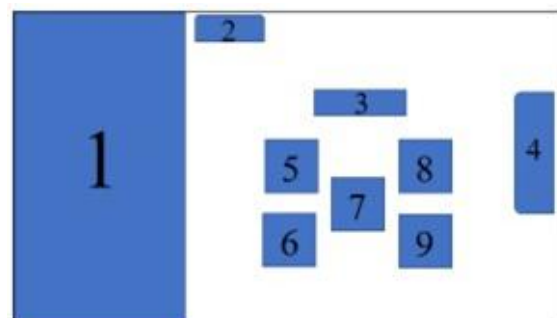


Figure 22. Menu Layout

Details:

1. Background,
2. Home button,
3. Text Let's Start,
4. Help Button,
5. Macramé General Knowledge Button,

6. Quiz Button,
7. Macramé Knot Learning Button,
8. Tools and Materials button, and
9. Macramé Bag Making Learning Button.

Macramé art learning material is displayed in the form of interactive learning multimedia, which is made by directly recording the steps of making macramé knots and their development as well as making macramé bag products. The material presented in the development of interactive learning multimedia for macramé art on bag products includes a macramé menu regarding basic knowledge of macramé art which discusses the meaning and history of macramé art, a tools menu regarding knowledge of tools and materials for making macramé, a knots menu regarding basic knot learning videos and development macramé art, a menu bag about learning how to make macramé bag products from the design to the process of making macramé bags, and a quiz menu for evaluating learning outcomes.

3.3. Development Step

The development stage is the stage of making media into a real product, in which there are several steps, namely compiling macramé art material, tools, and materials, making video tutorials on types of knots and their development, making video tutorials on the process of making macramé bags, making learning media, publishing, and packaging.

3.3.1 Material Arrangement

The material is arranged based on the needs of students in order to understand the art of macramé starting from the definition, brief history, knowledge of tools and materials as well as knowledge of the basic types of knots and their development.

3.3.2 Video Shooting

Making videos starting from tools, materials, types of knots, and the process of making bag products as material to be used for learning media is carried out for approximately one week by writers, talents, and videographers.

3.3.3 Recording Audio

Audio capture in the form of narration is descriptive audio regarding macramé art material, explanations of tools, materials, pronunciation of titles, and descriptions of the process of making knots as well as descriptions of the process of making products.

3.3.4 Learning Media

Making interactive learning media using Adobe Flash Professional includes importing images, creating navigation buttons, and creating animation effects. The buttons contained in the learning media are the get started

button to enter the home screen, the button (i) for information or assistance, the profile button, and the exit button. The navigation made in the tutorial video is in the form of play, pause, and volume buttons. Instructional media are supplemented in the form of transition effects, captions, audio, background, and animation to make the media look more attractive when used. See **Figure 23** for the opening screen and **Figure 24** for the overview multimedia.

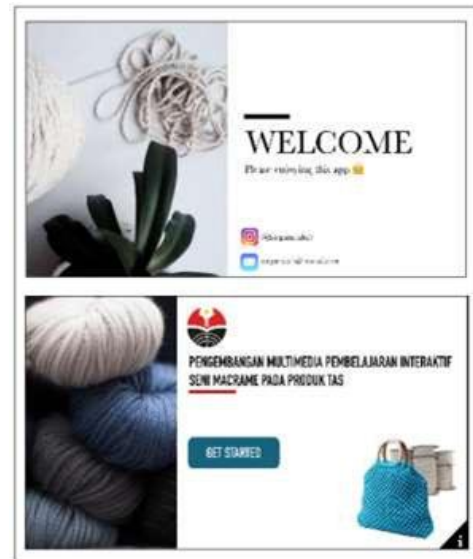


Figure 23. Opening Screen on Interactive Learning Multimedia



Figure 24. Overview 1 of Interactive Learning Multimedia



Figure 25. Overview 2 of Interactive Learning Multimedia

3.4. Implementation Step

The implementation stage is the stage of implementing multimedia that has been created to ensure or measure the achievement of the development of macramé art interactive learning multimedia. To measure this, a validation test was carried out on media experts and material experts with the aim of knowing where the deficiencies and feasibility of the learning media that had been made were carried out.

3.4.1 Validation by Material Experts

Two experts in the field of macramé art, namely academics who teach macramé art and entrepreneurs in the field of macramé art, validated the material for developing interactive learning multimedia for macramé art on bags. The aspects seen in the validation of interactive learning multimedia development material are learning aspects and general aspects. The validation results can be seen in **Table 1**. **Table 1** data displays the validation results from the assessment aspect of the development of multimedia interactive learning macramé art on bag products by two material experts, the results

obtained have a feasibility percentage of 91.55% which can be categorized as valid/feasible to use as a continuous reference.

Table 1. Validation by material experts

Aspect	Number question	Criterion score	Score	Percentage
General Learning	5	20	18.5	92.5
Macrame Art Material	2	8	6.5	81.25
Knowledge of Tools and Materials	2	8	7.5	93.75
Video Tutorial on Learning Basic Knots and Developing the Art of Macrame	14	56	56	100
Macrame Art Learning on Bag Products	9	36	32.5	90.28
Average				91.55

3.4.2 Validation by Media Experts

The validation of the development of interactive learning multimedia for macramé art on bag products was carried out by two experts in the field of multimedia. The aspects seen in the validation of interactive learning multimedia development media are the appearance of the media in general and the appearance of each menu presented, which includes an assessment of the display of images, the effectiveness of navigation buttons, the effectiveness of using text and animation, the quality of audio, video, and narration, and background. The validation results can be seen in Table 2.

The data in Table 2 displays the validation results from the assessment aspect of the development of multimedia interactive learning macramé art on bag products by two media experts, the results obtained have an eligibility percentage of 95.3% which can be

categorized as valid/feasible for used as a reference on a continuum.

Table 2. Validation by Media Experts

Aspect	Number question	Criterion score	Score	Percentage
General view of interactive learning multimedia development	11	44	42.5	96.6
Display on presentation of macramé art materials	7	28	26	92.85
Views on material tools and materials	8	32	30	93.75
Views on Video Tutorials for Learning Basic Knots and Developing Macramé Art	7	28	27	96.43
Views on macramé art learning on bag products	8	32	31	96.87
Average				95.3

3.4.3 Validation by Media Experts

User validation of the development of macramé art interactive learning multimedia on bag products is aimed at testing learning media devices and knowing the user's assessment of the feasibility level of macramé art interactive learning multimedia development on bag products. The results of the validation can be seen in **Table 3**. The data in **Table 3** displays the validation results from the assessment aspect of the development of multimedia interactive learning macramé art on bag products by users, the results obtained have a feasibility percentage of 96.5% which can be categorized as feasible to be used as an art learning media macram

From the results of validation by material experts and media experts, there are findings. The findings are useful so that multimedia development is made more complete and in accordance with existing material in the field, making multimedia development better and more interactive and functioning effectively, and easy to understand according to input from experts. The following is input from material experts.

Table 3. Validation from User

aspect	Number questions	Criterion score	score	percentage
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General View of Macramé Art Interactive Learning Multimedia Development on Bag Products	9	36	35	97.2
General learning materials	3	12	11.5	95.8
Average				96.5

- The materials used are not the main reference and are only examples of materials so that users can explore more materials
- Exploring more materials, colors, and shape variations to practice implementing existing knots
- Variations in bag design should be more than one type, for example adding types of clutches, backpacks, and so on which have different structures, so that users have a reference if they want to make bags with other designs, but the structure is the same.

Here is input from a multimedia expert.

- Clarify help and information navigation buttons so that users read the guide first before operating multimedia.
- Balancing between back sound and narrator audio
- Added video buttons for as many videos as loaded and added a "play" icon
- Displays an image of a bag equipped with measurements for making firing patterns

3. CONCLUSION

The development of interactive learning multimedia is adjusted to the eligibility standards of learning media including the use of backgrounds, text, images, audio, video, animation, and narration. Interactive learning media assessment is carried out by means of validation by material experts and multimedia experts. The results of the validation show that the development of macramé art interactive learning multimedia on bag products is valid/fit to be used as a learning medium with a few findings and suggestions from material experts and multimedia experts. The validation of multimedia experts obtained a percentage of 95.3% that interactive multimedia learning assessed was valid/suitable for use as a learning medium. The results of limited trials on the user obtained a percentage of 96.5% rated worthy to be used to support the process of learning macramé art on bag products. The results show that this interactive learning media can be used as a model for developing macrame art interactive learning media for bag products while still paying attention to the help button in using the media and the balance between back sound and

narration. Recommendations for further research that can be carried out related to this research is to explore more on various materials and the addition of types of bags as macramé products and test students to review their effectiveness in the learning process. Further research can be done by testing students to can see the effectiveness of learning multimedia in the learning process.

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