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Interactive Multimedia Design of Motion Graphics Using a Project-Based Learning Approach for Vocational Education Students: Experiments in Cooking Taliwang Chicken

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ABSTRACT

Technology is a means of conveying more meaningful information in 21st-century learning. However, only some teachers still utilize technology in the learning process. Teachers still need help combining computer-based media. In addition, 21st-century learning emphasizes working methods using Project Based Learning (PjBL). Therefore, this research aims to develop interactive multimedia motion graphics based on PjBL in learning cooking. This research is a design-based research type research with the ADDIE model, which consists of five stages: analysis of needs and problems, design, creation, and evaluation of interactive multimedia motion graphics. The research results show that motion graphic creation is carried out in four stages: design, animation, compositing, and rendering. The motion graphic video resulting from this research consists of an introduction, learning outcomes delivery, materials and tools for making Taliwang chicken, and steps for making Taliwang chicken. It is hoped that this research can provide readers with knowledge about how to create motion graphics in productive tourism vocational school subjects to increase the learning process's effectiveness.

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1. INTRODUCTION

21st-century learning uses technology to convey information to students to create meaningful learning (Dede, 2010). Technology integration is designed to suit the needs of teachers and students as demonstrated through experience and content in forming knowledge. Technology appears through learning media that helps the learning process. Learning media is essential in concretizing abstract concepts (Mayarisa, 2023). In addition, 21st-century learning emphasizes working methods using Project-based Learning (PjBL) (Tiantong & Siksen, 2013). Technology can make PjBL features more effective by strengthening interactivity and smoother communication and facilitating learning based on actual problems and situations (Gómez-Pablos *et al*., 2017).

In facilitating lecturers and students to improve the quality of 21st-century learning, learning media should be updated according to technological developments to make PjBL more effective. Interactive multimedia allows students to simultaneously use the senses of sight and hearing to capture learning (Shalikhah, 2016), making it suitable for elementary school children. The combination of content developed through interactive multimedia is used as an intermediary in conveying information. All senses are hoped to capture the information and be recorded in the brain's memory. The development and use of multimedia have a positive impact on learning, including student-centered learning (Neo & Kian, 2003), and helps increase students' interest and motivation to learn (Al Husaeni *et al*., 2022).

Much research has been carried out regarding the use of interactive multimedia, including research into developing interactive multimedia based on learning approaches or models. Among them, the development of interactive multimedia is based on problem-based learning models (Rahmadani & Taufina, 2020; Gunawan *et al*., 2019; Umrella *et al*., 2019), the development of interactive multimedia approaches to science learning (Qistina *et al*., 2019; Khairani *et al*., 2023; Hadisaputra *et al*., 2019), development of web-based interactive multimedia using the Hannafin and Peck method (Pratomo & Irawan, 2015). Interactive Multimedia Based on Ispring Suite 8 (Ariyanti 2020), and the development of interactive multimedia in language learning (Mudinillah 2019; Alobaid, 2020). However, researchers must still develop PjBL-based Interactive Multimedia in Productive subjects at Tourism Vocational Schools. Based on problem identification and relevant research, this research was carried out to develop interactive multimedia motion graphics based on PjBL in learning cooking. Interactive Multimedia Development will focus on text, material, audio, video, animation, and interactivity, as well as additional input by adapting PjBL so that development is carried out following the learning steps and PjBL worksheets. It is hoped that this research will provide readers with knowledge about how to create interactive multimedia motion graphics, especially its application in productive tourism vocational school subjects, to increase the learning process's effectiveness.

2. METHODS

This research used the design-based research (DBR) method with the Analysis, Design, Development, Implementation, and Evaluation (ADDIE) model. This research consists of five stages: the needs and problem analysis stage, design, creation, and evaluation of interactive multimedia motion graphics. The Adobe CS application is used to create motion graphics. **Figure 1** shows the research procedure.

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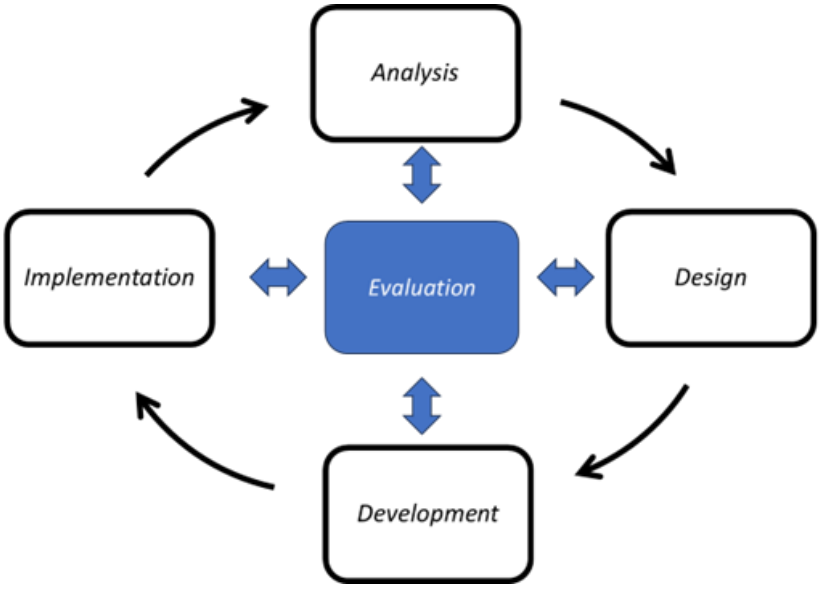

Figure 1. Research procedure.

(i) The needs analysis stage is the initial stage in development through observation and interviews. Analysis activities that must be carried out include (a) Analysis of students' character through learning capacity based on aspects of knowledge, skills, and attitudes; (b) Needs analysis based on learning problems experienced by students and teachers; (c) Analysis of the competencies that students are required to understand.

(ii) The design stage involves making a storyboard and determining the material and media elements in the form of images, video, animation, and audio in the learning media being developed. Then, prepare a reference test in the form of pretest-posttest questions in multiple-choice form.

(iii) The development stage is carried out based on the results of the storyboard. The product was developed using the Adobe CS application. At the development stage, motion graphics are created and divided into four stages: design, animation, composing, and rendering.

(iv) The implementation stage is carried out through testing learning media. At this stage, validation testing of learning media is also carried out by media experts, learning tools, and materials. The learning tools and materials are declared valid so that the learning media can be used, and the RPS and pretest-posttest questions are suitable to be tested on students.

(v) The evaluation stage is the final stage in developing interactive multimedia motion graphics.

3. RESULTS

This research produces motion graphical videos. This section explained the stages of developing motion graphics as interactive multimedia in food preparation subjects at Tourism Vocational Schools. Making motion graphics can be divided into four stages, as explained by Siregar (2017): design, animation, compositing, and rendering.

3.1. Design Stage

At the design stage, the visual creation of objects is carried out, the primary material for motion graphics. The design stage involves creating elements according to the graphic sketch

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created in the previous storyboard. **Figure 2** shows the motion graphic storyboard that we developed. We make a storyboard by paying attention to the learning process that will be carried out. We separate the storyboard components into four columns: description, visuals, audio, and time.

STORY BOARD

VIDEO ANIMASI INTERAKTIF PEMBUATAN AYAM TALIWANG SEBAGAI MEDIA PEMBELAJARAN

Mata Kuliah : Pengolahan dan Penyajian Lauk Pauk
Nama Produk : hidangan berbahan dasar ungags (pembuatan Ayam Taliwang)
Penulis Naskah : Atat Siti Nurani Msi, dkk
Dosen validasi materi : chef Anton SPd
Dosen validasi story board : chef sobur
Durasi : 9 menit 58 detik

No.	DESKRIPSI	VISUAL	AUDIO	WAKTU
1.	**SCENE 1: Opening** 1. Dalam *opening* pertama, menampilkan logo dan nama Universitas Pendidikan Indonesia (UPI). Menampilkan nama program studi serta departemen.	1 . Logo UPI : (kualitas gambar 345x345 pixels, jenis gambar PNG) 2. Universitas Pendidikan Indonesia, Fakultas Pendidikan Teknologi Dan Kejuruan, Program Studi Pendidikan Tata Boga, 2023 (Berlin sans FB demi, size 80, warna hitam, background putih).	Musik latar : Gending kesenian lombok (Pada proses editing, suara musik latar di keraskan)	5 detik

Figure 2. Story Board Motion Graphics.

3.2. Animation Stage

In the animation stage, the process of moving still image objects is carried out to look like they are moving. In this research, the animation process uses basic techniques such as adjusting opacity, scale, position, and rotation. We also added special effects such as CC sphere, transition, masking, and magnifying. **Figure 3** shows the animation process in making learning motion graphics.

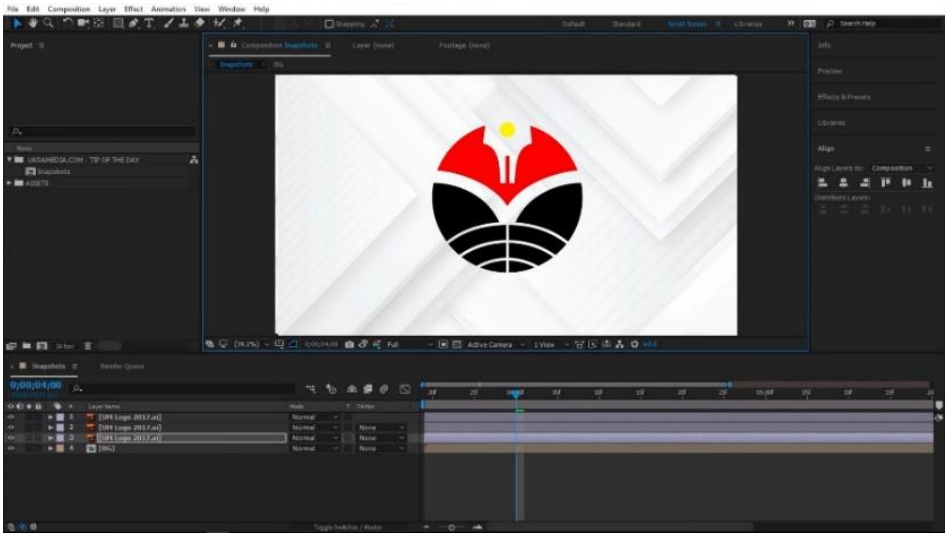

Figure 3. Animation Process.

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3.3. Compositing Stage

After the entire scene has gone through the rendering process in Adobe After Effects, the next step is compositing. **Figure 4** shows the compositing process in making motion graphics. All videos produced from the previous animation process are combined at the compositing stage.

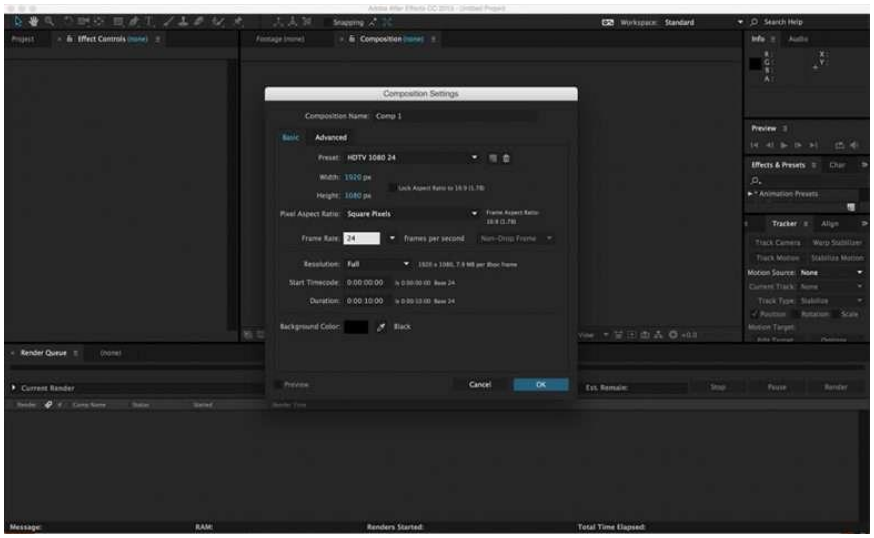

Figure 4. Compositing Process.

3.4. Rendering Stage

Figure 5 shows the process of rendering motion graphic videos. The rendering stage involves exporting or final processing various file formats in Adobe Premiere composition into a final video format.

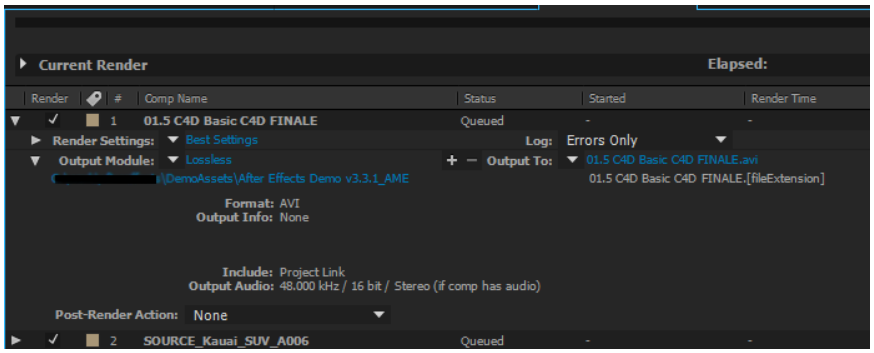

Figure 5. Rendering Process.

After the entire process was completed, interactive multimedia based on project-based learning in the form of a motion graphic video regarding making Taliwang chicken was produced in this research. Based on several ADDIE steps, the motion graphics have gone through the validation stage by experts and are declared valid so they can be used. There are several stages shown in the motion graphic video of this research, namely introduction (**Figure 6**), delivery of learning outcomes (**Figure 7**), delivery of materials and tools for making Taliwang chicken (**Figure 8**), and steps for making Taliwang chicken (**Figure 9**). Learning outcomes are abilities obtained by internalizing knowledge, attitudes, skills, competencies, and accumulated work experience (Nurdin, 2018).

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Figure 6. Introduction Clip.

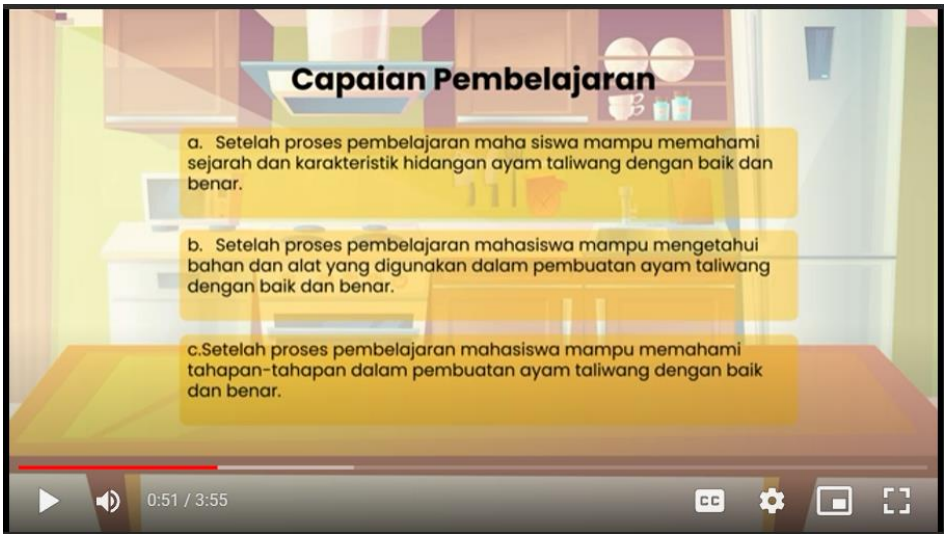

Figure 7. Delivery of Learning Achievements.

Figure 8. Delivery of materials and tools for making Taliwang chicken.

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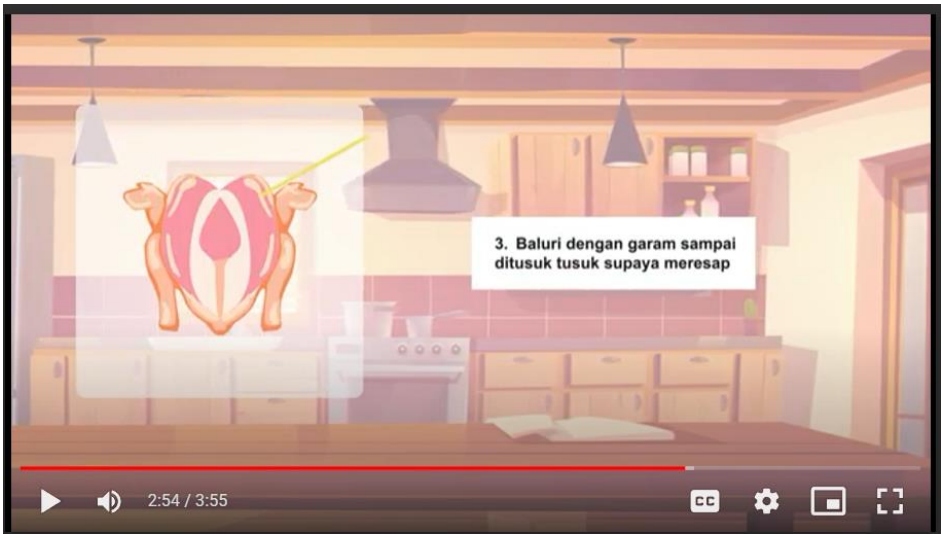

Figure 9. Steps for making Taliwang chicken.

4. DISCUSSION

This development research resulted in a product in the form of developing interactive video learning media for making taliwang chicken, which was created using the stages of design, animation, compositing, and rendering. Designing interactive videos using the stages of design, animation, compositing, and rendering can produce learning media that is good and suitable for use (Untari *et al*., 2020). This learning media product is intended for students in vocational education. Interactive video learning media for making taliwang chicken was done using Adobe Flash CS6 software. The research and development stages of interactive video media for learning to make taliwang chicken start from the definition/analysis stage. This stage is carried out with needs analysis, and initial research or needs analysis is critical to carry out to obtain initial information for carrying out development (Hariyadi & Yanti, 2019). Through document study observations and interviews, the needs analysis is divided into four stages, namely student analysis, lecturer analysis, curriculum analysis, and reference analysis. In the analysis of students and lecturers, it is known that lecturers and students are familiar with the use of technology-based media, one of which is during the learning process. The media used are presentation media in the form of power points learning videos supported by the projector and wifi facilities available in the campus environment. However, the learning process has not run effectively because lecturers often explain the material only using lecture or teacher-centered methods. It is also known that the media is still limited to books, job sheets, and presentation media in the form of power points. Apart from that, lecturers are constrained by the reduced time allocation in learning to make chicken taliwang. At the same time, the amount of theoretical and practical material is substantial so that students in the learning process are required to master much material in every meeting/face-to-face. Conventional learning makes students feel bored and less motivated, which results in a student being unable to learn as expected (Husna *et al*., 2019).

Based on curriculum and reference analysis, it is known that the objective of learning material on processing and serving side dishes is that students can analyze and make various types of side dishes properly and correctly, one of which is making taliwang chicken. All students must master skills in making products. Therefore, before carrying out the practicum, students can practice by watching the making of taliwang chicken through an interactive video (Darling-Hammond *et al*., 2020). The design stage of the learning media product for

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making taliwang chicken was carried out by designing content and interactive video displays. The design began with collecting materials for making taliwang chicken in the form of source material books. After the material has been collected, the next step is to look for and collect animated images and music as supporting display content for interactive video media. The results obtained are in the form of flowcharts and storyboards. After the product design has been designed, the product creation continues, assisted by a programmer using Adobe Flash CS6 software by combining several softwares, such as Corel Draw and Adobe Premiere Pro for video editing. After the learning media is created and ready to be used, the next stage is the development stage, the animation creation stage. Animation is moving still image objects to make them look as if they are moving. This animation process uses basic techniques such as adjusting opacity, scale, position, and rotation. It can also involve using special effects from software such as Adobe After Effects, such as CC sphere, transition, masking, magnifying, etc. Next is the compositing stage. After the entire scene has gone through the rendering process in Adobe After Effects, the next step is compositing. This involves merging all the videos resulting from previous animation processes. This compositing process is usually done using software such as Adobe Premiere. The final stage is the rendering stage, the final step in creating motion graphics. This involves the export or final processing of various file formats in Adobe Premiere composition into a final video format.

This PBL-based interactive animated multimedia product on the subject of making taliwang chicken is equipped with images, animation, audio, and video that support the material's content on making taliwang chicken. The characteristics of learning multimedia include having more than one convergent media, for example, combining audio-visual elements, being interactive, in the sense of having the ability to accommodate user responses, being independent, in the sense of providing convenience and completeness of content in such a way that users can use it without human guidance (Budakoğlu *et al*., 2023).

This PBL-based interactive animated multimedia product has two crucial aspects in the success of learning (Fitriani *et al*., 2021). The success of learning is determined by two main components, namely teaching methods and learning media (Metekohy *et al*., 2022). The PBL learning model is a learning approach that is considered to have characteristics of scientific learning (Markula & Aksela, 2022; Sukma, 2020; Nurhidayah *et al*., 2021). Problem-based learning is a student-centered method, and teaching involves problems regarding the topic to be studied. This theory is a constructivist theory that focuses on students (Gezim & Xhimara, 2020; Widiawati *et al*., 2018).

The interactive video on making taliwang chicken can be accessed and used anywhere and anytime. The interactive video-based learning media in this research is suitable for use as learning media and can be well-received by students (Lestari *et al*., 2022). Quality learning tools must meet the criteria for the validity of learning media. These validity components include content and construct validity. From the assessment of these aspects, the development of learning tools can be said to be valid (Ali *et al*., 2023).

Learning media is developed to support the achievement of predetermined learning goals. This is related to changes in behavior and increasing students' knowledge and skills related to the topics studied (Williamson *et al*., 2020; Swiecki *et al*., 2022; Bin Mubayrik, 2020). Interactive learning videos have been developed with an attractive appearance so that learning is not monotonous, and the questionnaire results show that the learning material in the interactive videos is appropriate and accessible for students to understand (Saubari & Sudatha, 2023). The presentation of the material via visual and audio means that students with various learning styles can easily accept the learning material (Shabiralyani *et al*., 2015; Fuady & Mutalib, 2018).

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5. CONCLUSION

This research aims to produce valid, practical, and effective computer-based interactive learning media created using Adobe CS software for cookware subjects so that it is suitable for use. This research is a DBR research with the ADDIE model, which consists of analyzing needs and problems, designing, manufacturing, and evaluating. The research results show that motion graphic creation is carried out in four stages: design, animation, compositing, and rendering. Each stage produces components used in motion graphics, such as storyboards, resulting from the design stage. The motion graphic video developed in this research conveys material about making Taliwang chicken food. The motion graphic consists of several clips, namely clips introducing the learning process, conveying learning outcomes, conveying materials and tools for making Taliwang chicken, and steps for making Taliwang chicken. With the completion of this research, it is hoped that it can help teachers build interactive multimedia based on project-based learning in teaching table manners in vocational schools.

6. AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. Authors confirmed that the paper was free of plagiarism.

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