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Development of Interactive Multimedia Based on Research of Hybridama Technology

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A R T I C L E I N F O

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A B S T R A C T

The ability to understand and apply the current methods of Biotecnology as hybridoma technology needs to be taught to students. But in conducting laboratory activities hybridoma technology in the classroom activities takes time and costs are relatively large. This study was conducted to generate instructional media for students based research. The purpose of this research is to produce learning multimedia of hybridoma technology in Biotechnology course. This study uses the ADDIE development model. The results of this research is based on the feasibility studies show that interactive multimedia on hybridoma technology feasible for use as a medium of learning. This feasibility in terms of the truth of matter by the matter experts in the amount of 88.96%, the feasibility of interactive multimedia as a medium of learning by expert instructional media by 75%, and students who have completed the course of biotechnology by 86.07%.

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INTRODUCTION

The progress and development of biotechnology are unable to be separated from the progress and support of basic sciences such as microbiology, biochemistry, molecular biology and genetics. Competence in mastering biotechnology can be achieved when the development of human resources is oriented to the competition to research and apply the latest methods of biotechnology (Nurcahyo, 2005). Human resource development in research competitions needs to be trained to students in order to produce graduates who have the ability to master and apply the latest methods of biotechnology such as hybridoma technology.

Understanding of hybridoma technology can actually be actualized through a practicum activity but to carry out these activities requires a long time and relatively high costs. Due to these limitations, it is necessary to conduct a research on hybridoma technology where the results of the research can be used as a study source for students in biotechnology. The results of observational analysis of Biotechnology learning difficulty in students including 14 out of 20 students or 70% of students stated that the material in the biotechnology course is difficult material for several reasons, such as biotechnology material that is abstract and less contextual. Therefore, it requires a learning media that is able to visualize the techniques in biotechnology so that it is not abstract with learning media.

Learning media has the ability to visualize a technique, namely interactive multimedia. Therefore, it is necessary to study alternative learning media that can overcome this problem, namely by developing interactive multimedia that contains analysis of concept discovery techniques through research. Research-based learning resources are very important because according to Yahya (2010), progress and achievements in the field of research are moving and growing dynamically and rapidly, so this must be an important consideration in preparing teaching materials. Such an approach will help students to recognize the missing link between theoretical studies available in textbooks and actual reality. Multimedia was chosen because in multimedia there are simulation models and media rich in learning materials such as animated graphics, videos and multimedia. Structured integrated audio facilitates much more effective learning of new knowledge (Malik and Agarwal, 2012).

METHODS

This research is a development research. This development research model uses R&D Analysis, Design, Development, Implementation, Evaluation (ADDIE), which was developed by Branch (2009). Visually the stages of ADDIE can be seen in Figure 3.1.

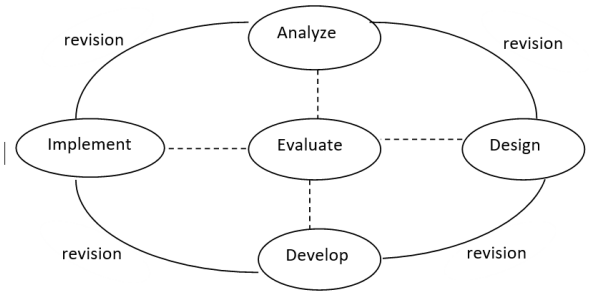

Figure 1. ADDIE Model Development Procedure (p. 2), Branch (2009)

In this study, the development model is limited to the develop phase. This is because of the limited research time to implement in learning activities. The process of developing this learning model begins in the analysis phase. This analysis phase is to find out the needs of students regarding learning media related to competence to understand the concept of biotechnology. There are two stages in this analysis, namely curriculum analysis and analysis of student learning resources conducted by distributing questionnaires to students who have taken Biotechnology courses and Biotechnology lecturers. The design phase includes planning research procedures in the laboratory, planning interactive multimedia storyboards about hybridoma technology and conducting research activities in the laboratory which includes immunization of 116 kDa protein in mice intraperitoneally. After 8 weeks the lymphocyte cells derived from spleen were isolated. The resulting lymphocyte cells were then fused with myeloma cells using PEG (Poly Etylen Glycol). After the fusion is done, it is grown on a culture plate that has been grown with a Feeder layer in the form of macrophage cells. The growth of fused cells was carried out in RPMI medium supplemented with HAT medium. Laboratory activities are documented as material for the development of research-based interactive multimedia on hybridoma technology. The research was conducted from January to March at the Molecular Biology Laboratory, State University of Malang and Central Laboratory of Biological Sciences, Universitas Brawijaya Malang. The next stage is the development stage. This stage includes activities to create, develop, modify and test interactive multimedia products based on research on hybridoma technology. The product trial includes interactive multimedia validation of hybridoma technology by experts involving one Biotechnology material expert and one instructional design and media expert. Furthermore, a formative evaluation of the validation results was carried out in the form of revisions of the Biotechnology material, followed by a formative evaluation of the validation results in the form of revisions from media experts and learning designs. Each expert was asked to assess the design, so that the advantages and disadvantages could be identified. After knowing the shortcomings, then improvements are made to reduce these weaknesses. Furthermore, product trials were carried out on students, namely in individual groups consisting of 6 students and a medium group consisting of 13 students who had taken Biotechnology courses. After the product trial, the data were analyzed qualitatively and quantitatively.

RESULT AND DISCUSSION

The results of research in the laboratory carried out interactive multimedia development based on documentation and research results in the laboratory using Autoplay Media Studio 8.0 software (Figure 2). In this multimedia there are several menus such as instructions for using interactive multimedia, introduction, curriculum studies, author profiles, acknowledgments, introductions, work safety, attitudes in research, hybridoma technology schemes, evaluations,

glossaries, and research failures. picture 3).

Figure 2. Hybridoma Technology Interactive Multimedia Opening Page

Figure 3. Hybridoma Technology Interactive Multimedia Main Menu

The hybridoma technology menu contains all research activities in the laboratory including immunization, surgery, and macrophage isolation, lymphocyte surgery and isolation, myeloma cell culture, and lymphocyte and myeloma cell fusion (figure 4). Each menu contains research tools and materials, basic concepts, procedures, videos of the research activity process and research results (figure 5).

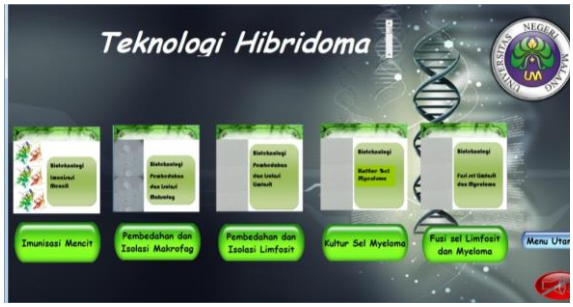

Figure 4. Hybridoma Technology Menu in Multimedia

Figure 5. Menu for Macrophage Surgery and Isolation in Multimedia

The developed multimedia was then tested on the validators, namely media experts, biotechnology experts, individual group students and medium group students for improvements both in terms of multimedia essence and the biotechnology material itself (figure 6)

Figure 6. Multimedia Improvement Results

Based on the results and validation data analysis that has been carried out on the development of interactive multimedia about hybridoma technology in the biotechnology course at the State University of Malang, it is known that multimedia is feasible to be used as a learning medium. This feasibility is seen in terms of the correctness of the material by material experts, which is 88.96%, the feasibility of interactive multimedia as a learning medium by learning media experts is 75% and readability by students who have taken biotechnology courses is 86.07%. In addition, based on the results of the questionnaire, it is known that 83% of students agree that this multimedia is quite sustainable with the courses that have been taken. 83% of students said that all the subjects had been discussed enough where the definitions, tools and materials, work procedures and others had been explained. In addition, 83% of students think that the presentation of the material in this multimedia is understandable because the presence of pictures and videos makes it easier to understand. 100% of students revealed that the use of images, videos and audio in this multimedia can clarify their understanding of the content of the material because the multimedia includes working procedures to make it easier to understand the content of the material. In addition, 100% of students teaching materials are able to make it easier for them to receive hybridoma technology material in multimedia, including tools and materials and work procedures in the form of videos. From 6 students, 6 students or 100% of students are interested in learning by using this multimedia because pictures and videos can support the teaching and learning process to be more effective so that competency indicators are achieved.

Submission of new knowledge to students in order to achieve these competency indicators needs to be packaged in a form of learning media that is attractive to students, so that students are interested and motivated. One of the interesting learning media is interactive multimedia. According to Munir (2012), multimedia gives a new atmosphere in obtaining information through reading activities. Multimedia-assisted reading can provide several benefits, namely making reading activities more dynamic by giving new dimensions to words. Moreover, in terms of conveying meaning, words in multimedia applications can be a trigger that can be used to expand the scope of the text to examine a particular topic more broadly. Multimedia does this not only to provide more text but also to bring text to life by including sound, images, music, animation and video.

Interactive multimedia about hybridoma technology that was developed is the result of hybridoma technology research which is poured into a learning media for students in the form of interactive multimedia supported by relevant theories which aim to visualize hybridoma technology theory which has many limitations if carried out in lecture activities it becomes easier to understand by students and students know the techniques without having to do it themselves because the resources of interactive multimedia are research results. In addition to containing

techniques in hybridoma technology, learning media also displays failures that occur in research activities. In research activities there are many obstacles that occur such as contamination in the cell culture process and cells that do not grow in the culture process. This obstacle is conveyed in multimedia with the aim of students having an attitude of not giving up easily when they fail. So that the results of research conducted can provide benefits to students. This is in accordance with Ardhana's (2002) statement that development research is conducted to bridge the gap between research and educational practice. In addition, Brew (2007) as well as Jenkin and Healey (2005) also provide a very good description of the importance of strategies to foster strong links between research and teaching at the higher education level. This interactive multimedia development research on hybridoma technology is used as a source of student learning. However, there are some disadvantages of interactive multimedia about the hybridoma technology being developed. Interactive multimedia requires a computer or laptop to operate it. This interactive multimedia was developed using Autoplay Media Studio 8.0 software which has limitations, namely the access speed is a little slow. In addition, on a computer or laptop that has a small resolution, the video will run slow and intermittent so it requires a computer or laptop with a high resolution.

CONCLUSION

The development of technology must always be followed by students so that students are capable to learn new things and will be useful for other human lives. New knowledge can be learned based on the results of research conducted by researchers. Such knowledge is more relevant than just a theoretical explanation. Hybridoma technology is explained more theoretically due to limited time, tools, materials and costs in practice in the field so that to study it requires learning media that can visualize the techniques used, namely interactive multimedia. To determine the feasibility of multimedia, a feasibility test was carried out on media experts, material experts, individual group tests and medium groups.

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