

DEVELOPMENT OF COMICS AS DIGITAL MEDIA IN THE OPTICAL COMMUNICATION SYSTEM COURSE AT THE ELECTRONIC ENGINEERING EDUCATION STUDY PROGRAM

ARUM SETYOWATI

Department of Electronic Engineering Education, State University of Jakarta, Jakarta, 13220, Indonesia.

WAHYU PRASETYO

Department of Electronic Engineering Education, State University of Jakarta, Jakarta, 13220, Indonesia.

BASO MARUDDANI

Department of Electronic Engineering Education, State University of Jakarta, Jakarta, 13220, Indonesia.

Abstract

The research aims to develop comic digital media in the Optical Communication System course for students of the Electronic Engineering Education Study Program, State University of Jakarta, as well as to test the feasibility level based on material experts, media experts and students. This study uses the Research and Development method with the Hannafin and Peck model which includes 1) requirements analysis, 2) design, 3) development and implementation. The results of the development of comic digital media in the Optical Communication System course are used in Standard, Architecture and Power Calculation materials for GPON, GPON Backhaul for LTE/LTE-A, and GPON as 5G Backhaul. The results of research and development are 1) comic digital media in the Optical Communication System course for students of the Electronic Engineering Education Study Program UNJ which has been developed based on the Research and Development method with the Hannafin and Peck model. The resulting product is a web comic into 43 pages and can be accessed at <https://fliphtml5.com/crfdj/oteq>. 2) The results of the feasibility test by material experts obtained an assessment percentage of 81.6%, meaning that the product was very feasible. 3) The results of the feasibility test by media experts obtained an assessment percentage of 95.6%, meaning that the product was very feasible. 4) field trials to students of the Electronic Engineering Education Study Program UNJ in the Optical Communication System course obtained an assessment percentage of 85%. Based on the feasibility category, it can be concluded that the comic digital media developed in the Optical Communication System course can be categorized as very feasible to be used as digital media.

Keywords

Digital Media, Comics, Optical Communication System.

INTRODUCTION

Education plays an important role for the development of a country in all areas of life. The indicator of educational success is the creation of capable and independent individuals through the learning process. At each level of education there is a teaching and learning process, for example at the tertiary level where the education unit provides higher education. In Indonesia, there are many universities. Especially in the Jakarta area, there are many

universities that have emerged and are accredited, one of which is the State University of Jakarta (UNJ). At the State University of Jakarta there are 8 faculties and one of them is the Faculty of Engineering, where in the Faculty of Engineering there are 17 study programs and one of them is Electronic Engineering Education.

The Electronic Engineering Education Study Program has 3 areas of expertise including audio video expertise, industrial electronics expertise, and telecommunications expertise. In the field of telecommunications expertise, there are elective courses, namely Optical Communication Systems. The Optical Communication System course aims to enable students of the Electronic Engineering Education Study Program to have the ability to understand the basic concepts of optical communication systems, conduct research and development on fiber optic transmission media to obtain maximum performance results in the use of optical fiber in telecommunications systems, so that fibre Optical transmission becomes a reliable transmission in telecommunications systems in the future(Conrad et al., 2005; Course, 2013; Hager & Pfister, 2021). The learning method used is Project Based Learning which emphasizes student activities in understanding, applying, and analysing optical communication system concepts(Hung et al., 2015; Peng et al., 2019; Seechaliao, 2017).

Based on Observations with Lecturers in the Optical Communication System course, students experienced some difficulties in some materials in which many theories were difficult to understand and lack of illustrations in explaining the material. The materials that are difficult to understand include GPON Standards, Architecture and Power Calculations, GPON Backhaul for LTE/LTE-A and GPON as Bakchaul 5G(Monti et al., 2012; Ramantas et al., 2014). The researcher also found that in the learning process in the Optical Communication System course, there was no use of comics as a learning medium and in addition, there was no use of comics as a learning medium in the field of engineering(Muhammad Usman, 2020; Nevin et al., 2021).

In Indonesia, the use of comics as a medium of learning has also been widely carried out in classroom learning, or as a medium of counselling for the community. However, learning comics in Indonesia are mostly dominated by natural science and mathematics(Arilaksmi et al., 2019; Koutníková, 2017; Pelton & Pelton, 2009). Therefore, researchers are finally interested in developing and innovating in overcoming the problems experienced in the Optical Communication System course at the Electronic Engineering Education Study Program by making comics as a learning medium where the final comic product is made in the form of a web comic. Based on the description above, then further development is carried out which aims to determine the feasibility of using comics in learning and developing comic products as effective digital media.

METHODS

The Hannafin and Peck model is the research method (R&D) used in this study. The selection of the Hannafin and Peck model is based on the consideration that this model is oriented towards learning products(Hannafin & Peck, 1998). Hannafin and Peck's model is a learning design model that is presented in a simple way, so it doesn't take long, starting from needs

analysis, design or design development and implementation(Lee & Hannafin, 2016). The Hannafin and Peck model is a teaching design model consisting of three phases, namely the requirements analysis phase, the design phase, and the development and implementation phase(West & Hannafin, 2011). In this model, assessment and iteration need to be carried out in each phase. The research subjects were 25 students of the Department of Electronic Engineering Education Semester 114, Faculty of Engineering, Universitas Negeri Jakarta.

In this research, the analytical technique used is descriptive qualitative technique, which is to describe the media product that was designed after being applied in the form of a product and to test the level of feasibility of the product made. Furthermore, using quantitative descriptive, which describes the feasibility of the product to be applied to the basic competencies of the Optical Communication System course. After the qualitative data was obtained, it was then converted into quantitative data using a Likert scale. The level of weight value used as a measurement scale is 4,3,2,1. The Likert scale can be expressed in various words from very positive to very negative. After getting each weight of each response selected for each question, then calculate the average score of the assessment results. According to the following formula for calculating the average score of the assessment results (Sugiyono, 2016a):

$$\bar{x} = \frac{\sum X}{n} \tag{1}$$

Explanation:

X = Average Score

n = Number of Appraise

$\sum X$ =The total score of each assessment

Then calculate the percentage of eligibility with the formula:

$$\text{Eligibility Percentage (\%)} = \frac{\text{instrumenresultscore}}{\text{totalscoreoftheinstrumen}} \times 100 \frac{\text{skorhasilinstrumen}}{\text{skortotslinstrumen}} \times 100\%$$

Next is the designation of the quality predicate of the product made based on the Rating Scale measurement scale? Rating scale is raw data obtained in the form of numbers and then interpreted in a qualitative sense (Sugiyono, 2016b). Eligibility categories are listed in Table 1.

Table1. Eligibility Category Based on Rating Scale

| No | Score in percentage (%) | Eligibility category |
|----|-------------------------|----------------------|
| 1. | 0%-25% | Not feasible |
| 2. | >25%-50% | Not worth it |
| 3. | >50%-75% | Worthy |
| 4. | >75%-100% | Very worth it |

The following is a description of table 1:

1. If the validated media reaches a percentage level of more than 75%-100% then the media is classified as very suitable for use and does not need revision.
2. If the validated media reaches a percentage level of more than 50%-75% then the media is classified as suitable for use and does not need revision.
3. If the validated media reaches a percentage level of more than 25%-50% then the media is classified as less suitable for use and needs revision.
4. If the validated media reaches a percentage level of 0%-25% then the media is classified as not suitable for use and needs revision.

RESULT and DISCUSSION

The research entitled Development of Comics as Digital Media in the Optical Communication System Course at the Electronic Engineering Education Study Program UNJ was carried out from February 2021 to June 2021. This research was carried out in accordance with the Research and Development procedure with the Hannafin and Peck model which consists of 3 stages, namely 1) Needs Analysis, including analysis of student conditions and learning in class, analysis of material content, formulating objectives, literature study, and analysis of comic concepts, 2) Design, including determining the form of comic media, making storylines and scripts, and making comic digital media, 3) Development and Implementation, including the draft of comic digital media, making validation instruments, expert validation, One-To-One product trials, Small Group product trials, product revisions, and field trials. The resulting product is a web comic.

The feasibility of the developed comic digital media can be known through validation by experts and students. The validation of media experts in this study was carried out by Dr. Dwi Prasetyo, Dipl.Inf, S.Kom, M.Si as a Lecturer in the Department of Computer Science, Faculty of Science and Engineering, Nusa Cendana University. The results of the media expert's assessment on aspects of comic design, content layout aspects, typographic aspects and illustration aspects stated that the average of all aspects obtained a percentage value of 95.6% which means the product is very feasible. The percentage of feasibility test results by media experts can be seen in Table 2.

Table2. Percentage of Feasibility Test Results by Media Experts

| No | Assessment Aspect | Percentage (%) | Explanation |
|----|-----------------------|----------------|---------------|
| 1 | Comic design aspects | 87,5% | Very worth it |
| 2 | Content layout aspect | 100,0% | Very worth it |
| 3 | Typography | 95,0% | Very worth it |
| 4 | Benefit | 100,0% | Very worth it |

| | | |
|------------------------|--------------|----------------------|
| Overall Average | 95,6% | Very worth it |
|------------------------|--------------|----------------------|

Material expert validation in this study was carried out by Dr. Efri Sandi, M.T from Jakarta State University as a Lecturer in Electronic Engineering Education. The results of the assessment by material experts on aspects of material relevance, evaluation aspects/practice questions, language aspects and usefulness aspects stated that the overall average aspect obtained a percentage of 81.6% which means the product is very feasible. The percentage of feasibility test results by material experts can be seen in Table 3.

Table3. Percentage of Feasibility Test Results by Material Experts

| No | Assessment Aspect | Percentage | Explanation |
|------------------------|--|--------------|----------------------|
| 1 | Aspects of Material Relevance | 76,6% | Very worth it |
| 2 | Aspects of Evaluation / Practice questions | 75,0% | Worthy |
| 3 | Language Aspect | 75,0% | Worthy |
| 4 | Benefit Aspect | 100% | Very worth it |
| Overall Average | | 81,6% | Very worth it |

The results of the assessment of 25 students during the field trial (Field Trial) on the presentation aspect and the usefulness aspect stated that the overall average aspect obtained a percentage score of 85%, which means the product is very feasible. The percentage of the feasibility test in the Field Trial by students can be seen in Table 4.

Table4. Percentage of Feasibility Test in Field Trial by Students

| | Assessment Aspect | |
|------------------------|---------------------|----------------|
| | Presentation Aspect | Benefit Aspect |
| Percentage | 86% | 84% |
| Description | Very worth it | Very worth it |
| Overall Average | 85% (Very worth it) | |

So based on the feasibility category, it can be concluded that the comic digital media developed in the Optical Communication System course can be categorized as very feasible to be used as digital media.

CONCLUSION

Based on the results of research from the Development of Comics as Digital Media in the Optical Communication System Course at the Electronic Engineering Education Study Program, UNJ was made using the Research and Development method with the Hannafin and Peck model. Hannafin and Peck's model consists of 3 stages, namely requirements analysis,

design, and development and implementation. The making of comic material is made in accordance with the Semester Learning Plan (RPS) for the Optical Communication System course. The resulting product is a web comic which is divided into 43 pages and can be accessed <https://fliphtml5.com/crfdj/oteq>.

Material feasibility testing conducted by material experts obtained an assessment percentage of 81.6%, which means the product is very feasible. The media feasibility test conducted by media experts obtained an assessment percentage of 95.6%, which means the product is very feasible. From the results of the field trial conducted on 25 students of the Electronic Engineering Education Study Program Universitas Negeri Jakarta in the Optical Communication System course in semester 114, the percentage of assessment was 85%, which means the product is very feasible. So based on the feasibility category, it can be concluded that the comic digital media developed in the Optical Communication System course can be categorized as very feasible to be used as digital media.

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