

Development of Interactive Instructional Media of Photography: Multimedia Skills Competency

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Abstract—This study was a Research and Development (R & D) using Instructional Development Institute (IDI) model (Define, Develop, and Evaluate). The aims were to produce a valid, practical, and effective Interactive Instructional Media Photography Subjects' Multimedia Expertise Competence. Respondents were the eleventh-graders of Multimedia secondary school, SMK PGRI 2 Badung, in the province of Bali, Indonesia. The primary data collection of validities and practicalities were collected through questionnaires while the effectiveness data through the test method. Consequently, were analysed using descriptive qualitative analysis. The findings showed that Interactive Instructional Media of Photography is a valid, very practical and very effective method. As an implication, Instructional Media Photography is expected to be used by teachers and students. This study could also provide some insights on developing similar approach.

Keywords—*interactive multimedia; research and development; instructional development institute; validity; practicalities; effectiveness*

I. INTRODUCTION

The development of Science and Technology bring changes to the increasingly global competition. Thus, the qualities of human resources need to be developed and enhanced. Education is one of the best ways to improve the quality of human resources. Indonesian Law [1], mentions the function of national education that is to improve human resources from internal to external individuals. In accordance to the above statements, the Government Regulation on National Education Standard [2], specifies the learning conditions should be implemented favorably and able to encourage learners to learn. The instructional process is mandated that vocational education provides an opportunity for learners to develop their potential and creativity; one of them is the area of Multimedia Expertise in Vocational Education. Instructional media is one of the major important components in the process of teaching and learning. Teaching materials play an important role in the learning process as a reference which is used by teachers or students [3]. Meanwhile, the teachers are to plan and develop learning materials [1,3].

Instructional is a teaching and learning activities which planned, implemented, and evaluated by educators in

consideration to the development of learners [4]. In this case, the lesson is Photography. Photography can be defined as the art of painting with light [5]. Thus, it takes a professional teacher in learning process.

Preliminary observations in SMK PGRI 2 Bandung, it was found that the teachers used a conservative lecturing method with one-way demonstration. In addition, the average learning outcome of 26 students of eleventh-graders multimedia expertise competence in their first semester of the school year (2014/2015) was only 76.92%. The result was under the school minimum standard of Photography subject which is 84%. That indicates the student's inadequacy on mastering the photography subject.

The teaching material used was mostly from self-study worksheet and the teachers were solely concerned on delivering the subject content according to the timeframe of standard syllabus. Age of the teachers was assumed to be one of the internal factors that cause the lack of innovative and creativity. Therefore, it is necessary to find the solutions to achieve the learning objectives optimally.

One of the solutions to improve learning outcomes and students' interest is to develop teaching materials in the form of interactive multimedia learning [4,6,7]. Based on the case matter, this study aimed to develop interactive learning media for Photography subject's competency. Through the medium of interactive multimedia learning, it is expected that students can learn more effectively and efficiently.

II. LITERATURE REVIEW

A. *Defining Research and Development (R&D) and Interactive Multimedia Learning*

Research and Development (R&D) is a process used to develop and validate educational programmer, product, and system through a cycle of steps: (1) Synthesize and Theories, (2) Explore, Hypothesis, (3) Design, Develop and Test, (4) Implement, Study Efficacy and Improvement [8]. It is a longitudinal approach to produce a certain product and test the effectiveness of it though some trials to be used by the community.

Interactive Multimedia Learning is a medium to deliver the knowledge that empowers the brain activity of all learners

through the navigation, interaction, recreation and communication with the use of computers [7,9]. It is time flexible, provide compact information in accordance with different materials needed, and user friendly. Although, it works only in accordance with the programmer, requires a multimedia device (computer), and its development takes time.

B. Components of Interactive Multimedia Learning

Interactive multimedia system is an integration of multimedia components or elements that become a single processing unit. Among many concepts of multimedia components, this study synthesized Munir's concept of Interactive Multimedia components [4]:

1) *Hardware*: Hardware components such as: (a) *Capturing devices*: video cameras, video recorders, audio microphones, keyboards, graphics tablets, 3D input devices, touch sensors and other hardware for digitizing or sampling; (b) *Storage devices*: CD ROMs, ZIP driver, DVDs, and others; (c) *Communication networks*: FDDI, ATMs, internet, etc.; (d) *Computer systems*: PC desktop, MPEG/AVI/DSP hardware; (e) *Complementary devices*: speaker, HDTV, colour printers, keyboard, etc.

2) *Software*: Multimedia software is a component system in the form of programs to control the system operation (authoring software). Such as Adobe Flash CS6, it is one of the best animation maker software which display various palette functions and choices to create an interesting animated works. In this study, Adobe Flash CS6 was used to create the prototype program of Photography's subject to develop an interactive multimedia learning.

3) *Creativity (Ideas)*: Multimedia design requires both creativity and technical skills to integrate two or more types of media. In order to create and develop an interesting interactive multimedia requires utilising the hardware and the software. Developing ideas and designs that unique will enhance the product quality and achieve the satisfaction of wider audiences.

4) *Organisation*: An organisation is needed to create and organise the details of an outline plan, i.e. skills, time, cost, devices, and resources required. The organisation will facilitate the developers or media producers on archiving and implementing the protocols.

C. The Process of Development an Interactive Multimedia Learning

The development of interactive multimedia requires several principles that need to be considered. The development based on the results of analysis and conditions. It requires a list of goals to be achieved in learning process which is in accordance with the syllabus and curriculum applied. The four basic stages that need to be accomplished are: (a) *Planning*—knowing what the teaching materials needed, where it will be use, how much will it cost, who will use the media, etc.; (b) *Instructional design*—a media learning design which is consider to be most suitable; (c) *Prototype*—the forms, structures, and components of the media that meet various

needs and conditions based on the design that has been developed. The production process of computer-based learning can be done with various application programs such as Macromedia Flash, Java Script, Adobe Premier, etc.; and (d) *Testing*—to implement and validate the product though trials before being used by wider audiences [4].

1) *Instructional Development Institute (IDI) model*: The development model of interactive multimedia learning using Instructional Development Institute (IDI) model. IDI model establishes the principles of a systems approach that involves three stages: (a) Define, (b) Develop, and (c) Evaluate [10, 11]. The first stage 'define' is analysing the background and identifying the problem. Then the second stage 'develop' is to develop and validate a prototype product. The third stage 'evaluate' means to test and analyse the results of the trials conducted.

III. METHOD

A. Study Subjects

Participants of this study was the eleventh-graders in 2014/2015 school year of Multimedia secondary class of SMK PGRI 2, Mengwi District, Badung Regency, Bali Indonesia. Considering the students average score which was under the standard competency of the school on Photography subject. In total, there were 26 students with 16 males and 10 females that were chosen for this study.

B. Design and Instruments

The IDI model was chosen for its approach that considered to comprehend the research question of this study. Started with the need analysis by seeing the characteristic of the students and the school facilities conditions to produce a valid, practical, and effective Interactive Instructional Media Photography Subjects' Multimedia Expertise Competence. The primary data collection of validities and practicalities were collected and assessed through questionnaires while the effectiveness data through the test method. Consequently, were analyzed using descriptive qualitative analysis. Figure 1 illustrates the study framework.

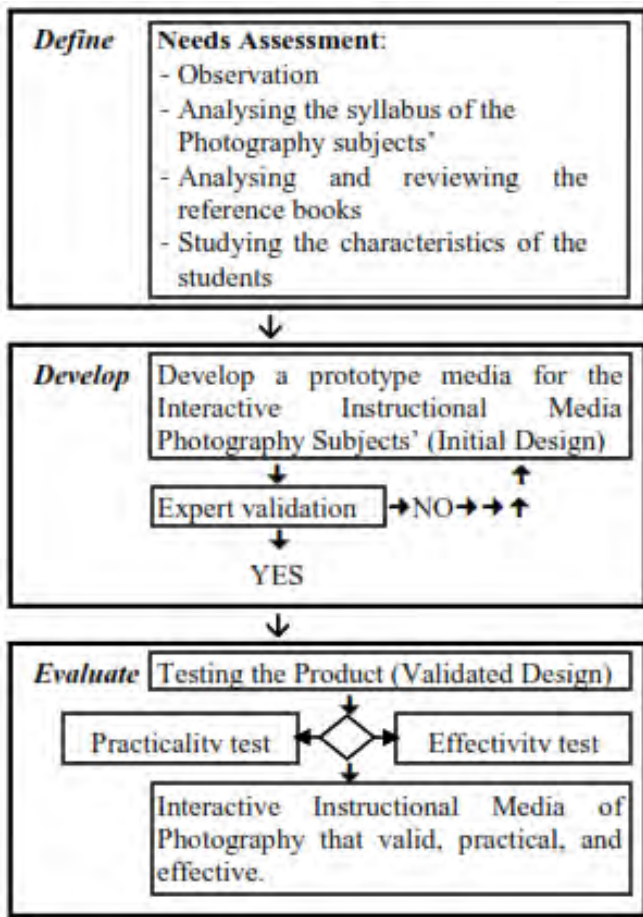


Fig. 1. The study's framework.

The defining stage, conducting a needs analysis through observation, analyzing the syllabus of photography subjects for the eleventh grade first semester of the standards competency on the Principles of Photographic Arts in Visual Communication Design for Multimedia, analyzing and reviewing the photography reference used, and studying the characteristics of the students.

The next stage is development, designing the initial design (prototype) of Photography Interactive Instruction Media and validate the prototype through the consents of some experts. Three experts had participated in validating prototype. Furthermore, out of three experts, two expert's assessment scores were analyzed for the validation of each aspect. The media component aspects were the design of staining concept, the use of words and language, the display on the screen, animation and sound, commands, and the display design. The material aspects were learning concept, curriculum, content, and character.

The last step is the evaluation (evaluate), testing the practicalities of the teachers and students and to test the effectiveness based on the achievement of student learning outcomes. Practicalities test for the teacher, the test instruments that were assessed including the easiness to use the media, time effectiveness, the interpretation of the media, and equivalence. For the student, there are three criteria being assessed and

analyzed, i.e. the level of difficulties, time, and the attractiveness of the media. To test the effectiveness of the media, the test was given to the student (test method) and comparing the results of students before and after using the media.

IV. RESULTS

The Photographic Interactive Instructional Media (PIIM) is packaged in the form of an interactive CD with .exe format that allows programs to be used without having to install it first on the computer. The results of the validation test done by some experts showed that the prototype which was being developed reaches the validation standard with an overall average score of 89.6%.

The teachers' practicality test of the media assessment was obtained after two of the school teachers use the validated PIIM. Table 1 showed overall score for the teachers' practicality of the PIIM was 88.5% which categorized as 'very practical'. The level of convenient was 85%, time wise 87.5%, media interpretation 93.3% and the equivalent of 90%.

TABLE I. THE PRACTICALITY TEST RESULT OF THE TEACHERS

No	Aspects	Score (%)			Category*
		P1	P2	Mean	
1	Level of convenient	85.0	85.0	85.0	Very Practical
2	Time wise	85.0	90.0	87.5	Very Practical
3	Media Interpretation	93.3	93.3	93.3	Very Practical
4	Equivalent	90.0	90.0	90.0	Very Practical
Average		87.7	89.2	88.5	Very Practical

Notes: P=Practitioner (the teacher)
*Referred to the Standard Practicalities Category of Interactive Multimedia-based learning [12]

The students' practicality test of the media assessment was obtained after a trial test of the validated PIIM were given to the students. This test was conduct in two stages of the same group of students, a small group test (limited trial) and a whole group test. In the small group of 7 students (table 2), the result showed 89.8% of overall score with the level of convenience in learning the photography subject through the developed PIIM was 91.4%, the time wise of 88.6%, and the media appeal of 89.3%. While the practicality test results of the whole group of 26 students (table 2) showed an average score of 83% with the level of convenience in learning the photography subject through the developed PIIM was 83.2%, the time wise of 81.3%, and the media appeal of 84.5%.

TABLE II. THE PRACTICALITY TEST RESULT OF THE STUDENTS

No	Aspects	Score (%)	Category*
Small Group of Student (n=7)			
1	Level of convenient	91.4	Very Practical
2	Time wise	88.6	Very Practical
3	Media appeal	89.3	Very Practical
Average		98.8	Very Practical
Whole Group of Student (n=26)			
1	Level of convenient	83.2	Very Practical
2	Time wise	81.3	Very Practical
3	Media appeal	84.5	Very Practical
Average		83.0	Very Practical

*Referred to the Standard Practicalities Category of Interactive Multimedia-based Learning [12].

The effectivity test of the PIIM was obtained through some tests that contains 25 multiple choices questions done by students. Before and after being given the PIIM was assessed (table 3). Before the students used the PIIM, only 23% of the students were above the standard competence of the subject. After the students used the PIIM, the results showed 80% of the students had reached the standard competence of the subject.

TABLE III. THE EFFECTIVITY TEST RESULT BASED ON PRE- AND POST-TEST OF THE STUDENTS PASSING GRADE ON PHOTOGRAPHY SUBJECT

Student's Score Below / Above the Standar Competency	Pre-test		Post-test	
	n	Percentage (%)	n	Percentage (%)
Below (<84)	20	77%	6	23%
Above (>84)	5	12%	21	80.8%

Note: N=26

Statistical analysis was conducted to assure the effectiveness result of the PIIM. The Kolmogorov-Smirnov of two-tailed normality test were used to analyses the distribution of the data and the significant value of the study result. Consequently, the pre-test was 0.629 and the post-test was 0.062 which indicate both values are normally distributed ($p > 0.05$). Meanwhile the homogeneous of the data variants was calculated using F-test. Both the F count (0.305) and F table (1.96) showed that the data were homogeneous. The results of the t-test showed that there are significant differences in the test score ($p < 0.05$), between before and after using the PIIM.

V. DISCUSSION AND CONCLUSION

This study was based on R&D which aimed to develop and validate the interactive media on Photography subject. The development of this study is started from the needs analysis of the eleventh-graders academic subject on 'Applying the Principles of Photographic Arts in Visual Communication Design for Multimedia' subject. The syllabus was to identify parts of photographic cameras, identify the rules in the shooting object (Third of Rules), arranging the lighting, photographing the object, process the results of the shooting.

The development of the prototype was made precisely by using the Instructional Development Institute (IDI) model. Started with identifying the problem and the characteristic of the students. Researchers had stated that students who aged 16 years old or above are ideally able to do a complex problem solving and abstract thinking [13-15]. Meanwhile, by using a multimedia application, the user can control the elements feasibly [16]. The average validation test score was categorized as a very feasible interactive media learning [12]. Furthermore, in comparison with some studies [6,17,18], the results of this study validation test that nearly 90% showed that the prototype interactive media used for this study is better and suitable for the study subject.

The practicalities of the product are good if people who use the product assume it to be useful product [19]. The practicalities of the PIIM was showed to be very practical for both students and teachers. In coherence with some studies that

used the same approach method [20,21], the results were mostly higher than 80% was considered 'very practical'. Therefore, the findings indicate that the Photography Media Learning is proved to be very practical to be used in the learning process.

The effectiveness of the interactive media which is used can be seen from the results of students' cognitive learning. The results showed a significant increase of student achievement score by 70%. The result of a similar study showed an increase of student test results [6,22]. Thus implied that the interactive media learning can facilitates the students to better understand the subject matter.

Overall, this study had achieved its objectives by producing a valid, practical, and effective computer-based learning product in the form of interactive multimedia and hence improving student learning outcomes. Although there were some unavoidable limitations of this study. First, the result of this study could not be generalized due to its small sample size. Secondly, the method used was specified to a certain condition of characteristic. Finally, its time-consuming process and requires an expertise in developing a feasible interactive media which might extend the cost.

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