Development Supplementary Digital Media for Microprocessor Short Course Training by Using Augmented Reality (AR) Technology

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Abstract- **The purposes of this research were to develop and validate the digital media that was created with AR technology in microprocessor short course training. The research presents the development of digital media for short course training by AR technology and compare performance of media with basic media. Digital media creation is instrument to expand knowledge by using multimedia put in microprocessor worksheet and content on short course training so can learn by yourself. The digital media was created by HP Reveal application platform of HP development company because it is standard for work and develop. The sample group is used 30 students of electrical and electronic field divided into two group, fifteen people per group for factor test compare. Research experimental result: 1) the digital media is good in standard evaluation criteria. 2) evaluation of media learning outcome efficiency is 84.01/83.77 (E_1/E_2) which corresponding with criteria for evaluation set (80/80). 3) the t-test of sample group which used digital media by AR technology, accomplishment of pre-test and post-test is significantly difference in level .05. 4) the average of satisfaction value is around good level (4.47). In conclusion of research can conclude to digital media by used AR technology is good for self-study in short course training and other learning management.**

Keywords: Accomplishment, AR Technology, Efficiency, Electrical, Electronic, Evaluation Criteria, HP reveal, Microprocessor Short Course, Satisfaction

I. INTRODUCTION

Augmented Reality (AR) is a technology that brings 3D images simulated into the real world through the camera and is processed by making 3 Dimension (3D) objects (virtual images) overlapping with real images as a single image by look directly through the camera [1][2]. Augmented Reality (AR) technology has existed since 2010, mainly using Augmented Reality (AR) in Game and Entertainment mainly. But today, the education begins to use Augmented Reality (AR) to create teaching materials [3]. Education is an activity that brings information technology together. Since the use of computers as teaching materials Computer curriculum preparation until the use of computers [4], media development, teaching and learning "Computer Assisted Instruction" or CAI – Computer Aided Instruction [5].

The microprocessor originated in the early 1970s, by the development of two technologies, which are digital computer technology and solid-state digital computer [6] that will work according to the program that we entered by the program to tell the computer. Basic knowledge must know about microprocessors such as fetch, decode, execute, memory and write back [7]. Microprocessor is a computer processor that incorporate of functions in a central unit [8].

This paper purposes of this research were to develop and validate the digital media that was created with Augmented Reality (AR) technology in microprocessor short course training. We design digital media for short course training by Augmented Reality (AR) technology and compare performance of media with basic media by HP Reveal application. HP Reveal is an application used to create media in the virtual reality world. Suitable for devices running iOS and Android operating systems. HP Reveal is an intermediary for connecting the world of truth. And virtual reality together by showing the result in the form of interactive media that can be seen as still images, sound animations.

II. MATERIALS AND METHODS FOR INVESTIGATION

A. AR Technology digital media

Digital media was created for student sample group1 in microprocessor short course training only but group2 doesn't used in this research. Accomplishment value and efficiency value of digital media were founded and compared between group1 and group2. Digital media was created by HP Reveal application, methods of AR technology was AI tracking and maker method base on

the picture. When used mobile application on camera phone monitor into the picture that was created AR assess point, Hidden multimedia will be popup on the picture by augmented reality technology. Multimedia were used with AR technology can be picture, video, 3D, animation and other media. Conception of research design for research work can show in figure1.
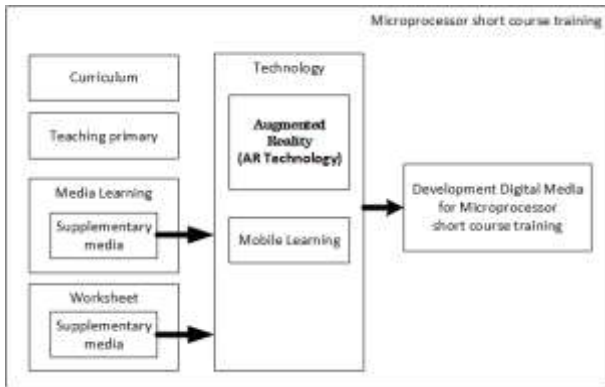

Fig 1. Conceptual framework for digital media development

B. Evaluation form and methodes

These materials are created and used with this research for collect the data of factor research as the following.

- The accomplishment quality form by test score collection in during course and after course of students in the sample group.
- The efficiency of AR digital media form by using accomplishment value of students into the factor calculate.
- Test form and worksheet of Microprocessor Short Course Training either pre-test form and post-test form for compared between during studying and after studying.
- The satisfaction quality form for collect data of student's attitude satisfaction value.

C. Methods for investigation

The qualitative assessment of digital media for microprocessor short course training by using augmented reality (AR) technology were evaluated by efficiency form with 5th Liker's scale. The sample group were divided into two groups for investigation compare, the first group is trying out group but second group wasn't using the digital media AR technology. In the group1, will be use efficiency test between during studying and after studying to factor analyze which compare with standard value set and Efficiency of digital media, analyze all data to t-test analysis, use the satisfaction test for view into attitude value of students in the group.

III. RESULTS AND DISCUSSION

The qualitative assessment of digital media for microprocessor short course training by using Augmented Reality (AR) Technology was evaluated by microprocessor experts, shown in table 1.

TABLE 1. DIGITAL MEDIA WITH AUGMENTED REALITY TECHNOLOGY FOR MICROPROCESSOR SHORT COURSE TRAINING

Details	Mean value	Level
1. Design	4.33	Good
2. Technical	4.33	Good
3. Usability	4.67	Excellent

Table 1. Show the quality of digital augmented reality media that show the mean values and detail from research investigation. In design is good at mean value of 4.33, In technical is good at mean value of 4.33 and the Usability is the best of other details. Usability is excellent level with mean value of 4.67, It is considered to assess the quality of the digital media.

Fig 2. AR Technology in HP Reveal application mobile.

Fig 3. HP Reveal augmented reality platform.

Figure2. shown the operation of Augmented Reality (AR) Technology method in Microprocessor short course training digital media.

Figure3. The HP reveal platform on website of HP development company was used in this research that fifty people sample group.

TABLE 2. THE EFFICIENCY OF AR DIGITAL MEDIA, THE EXPERIMENTAL GROUP SHOW OF E_1/E_2

Efficiency	Average
E_1	84.01
E_2	83.77

Table 2. shown the results of efficiency of digital augmented reality media that equation1 is efficiency of during studying and equation2 is efficiency of after studying by used that media. The average value of equation1 is 84.01, equation2 is 83.77. The results were corresponding with value set at 80/80

TABLE 3. LEARNING ACCOMPLISHMENT TEST OF SAMPLE IN THE SHORT COURSE TRAINING BY USING AR TECHNOLOGY

Accomplishment	Sample (n)	Average ($\bar{x}$)	t value	sig
Pre-test	15	16.33	35.194*	.000
Post-test	15	43.27		

Table 3. Results of learning accomplishment in microprocessor short course training that used AR digital media can be described as follows. Sample of pre-test found an average in 16.33 and post-test in 43.27, the test in microprocessor were accomplishment test that fifty full score. Result of t-test value was calculated data factor in SPSS statics program as to 35.194, accomplishment of pre-test and post-test is significantly difference in level .05 (sig value at .000)

TABLE 4. SATISFACTION RATE OF THE SAMPLE. DIGITAL MEDIA FOR MICROPROCESSOR SHORT COURSE TRAINING BY USING AR TECHNOLOGY

Details	Average	Level
1. Design	4.53	Excellent
2. Multimedia	4.67	Excellent
3. Understanding	4.13	Good
4. Interaction of digital media	4.27	Good
5. usability	4.20	Good
Overall	4.36	Good

Table 4. the result show satisfaction rate of sample group. AR digital media for microprocessor short course training is used to test. Satisfaction rate can be described as follows. Digital media in design is excellent level, multimedia of digital media is same as design level. Understanding, interaction of digital media and usability are good level. Overall from average of satisfaction rate can be conclude that AR digital media is good level an average of 4.36.

IV. CONCLUSION

This research result of development supplementary digital media for microprocessor short course training by using augmented reality (AR) Technology. In this research studied quality and effective of digital media that used Augmented Reality technology, Included accomplishment and satisfaction index of students in the microprocessor short course training. So created AR digital media by HP Reveal platform for research investigation. From results can be summarized as follows, evaluation of digital media by using AR technology was good, efficiency of digital media was meet the criteria value set at 80/80 by 84.01/83.77 of result that are view to the standard media for learning, digital media is the convenient instrument that effected to accomplishment of students at significantly difference in level .05, in experimentation can indicate about satisfaction with AR digital media of student that in good level.

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