

The Development of Active Learning in Computing Science Using Augmented Reality Technology

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Abstract:

This article applied Augmented Reality technology as materials to the educational materials for teaching. The purpose of this research were 1) to design the development of Active Learning in Computing Science Using Augmented Reality Technology and 2) evaluate the Active Learning in Computing Science Using Augmented Reality Technology. The statistics used for data analysis were mean (M), standard deviation (S.D).The design process as built out in the form of an Augmented Reality by working with an application in the operating system. The advantage of these applications will enhance the students' understanding of scratch in the Computing Science. Were displayed in the form of real and virtual Interactive to increase understanding for the students. The result were 1) The Scratch program Learning Media in Computing Science Using Augmented Reality and 2) the result of evaluation from five experts of the scratch program learning media in computing science using augmented reality was found at a high level (\bar{x} = 4.26, S.D. = 0.66).

Keywords —Augmented Reality, Computing Science, Scratch program, Active learning

I. INTRODUCTION

The Ministry of Education has developed digital content in the form of online media through e-book websites or applications, and has the concept of creating a digital learning platform to support the change. The current technology adapt the life and learning. The new technology will create the creative interaction and the characteristics of the learners. Thai citizen will use of technology media that respond to instructional sustainability. [1] Teaching and learning in science courses for Thai students In the fourth grade, even though the students were selected, they found that teaching Science subjects 1) Students have low academic achievement. 2) Students become bored because of their content in science subjects. 3) The matter of time management during teaching and learning. In the classroom, the researcher has developed the Augmented Reality, which is capable of presenting both audio and video. The animation makes the lesson interesting and interesting if the theoretical content is boring, it will be easier to understand and benefit the learner in order to study the knowledge as needed and have a good attitude towards the

study. Thus if the teacher use the learning media by using Augmented Reality (AR), which is used to describe a combination of technologies that enable real-time mixing of computer generated content with live video display. AR is based on techniques developed in VR [2] it will be useful for students to achieve the learning.

II. OBJECTIVE

A.Design the development of Active Learning in Computing Science Using Augmented Reality Technology.

B.Evaluate the Active Learning in Computing Science Using Augmented Reality Technology.

III. LITERATURE REVIEW

A. Computing science

The Institute for the Promotion of Teaching Science and Technology [3] stated the science curriculum in the core curriculum changed of learning standards and indicators of science learning in the core curriculum by revised standards and metrics and add technology, which consists of. Designing and technology and computational science. The goal of the change in learning

standards and indicators is to provide educational institutions with basic education that is consistent with economic and social changes. The Government's development a policy about the standard of learning and the new indicators, the goals to focus in developing the learners. It is important to note that, as learners are learning, Based on the indicators in this new science topic, the knowledge and skills identified in the core curriculum. Therefore, the new indicators has developed. Technology is a technological development by itself, from the application of knowledge, science, mathematics, technology which is relevant to the technology, including skills development. The 21st Century for life in a new generation of society of highly competitive and well-qualified digital citizens.

Computing science is a discipline that will replace a computer course or a technology course. There are currently teaching and will move from basic subjects in the field of career and technology to be the field of science.

The thing that has changed in this subject is that kids will not just learn basic computer programs but this new subject will teach children can analytical thinking is systematic and can be applied to solve problems creatively in disciplines such as mathematics, humanities, and other subjects.

It also makes children can deal with complicated problems or they can think with open-ended questions. The computational science is an indispensable field in the development of applications. Therefore, can also apply this course to a variety of courses. This will help us see the relationship between each subject better than last curriculum. Each subject must be adjusted for use in the classroom or in the future.

The curriculum for students in Elementary school focuses on instruction in simple designing and programming, through Scratch program, as a software or instructional media.

B. Scratch

SCRATCH is a programming language that lets you create your own interactive stories, animations, games, music, and art. With Scratch, you can program your own interactive stories, games, and animations and share your creations with others in

the online community. Scratch helps young people learn to think creatively, reason systematically, and work collaboratively essential skills for life in the 21st century. [4]

C. Augmented Reality (AR)

Whereas virtual reality (VR) places a user inside a completely computer-generated environment, augmented reality (AR) aims to present information that is directly registered to the physical environment. AR goes beyond mobile computing in that it bridges the gap between virtual world and real world, both spatially and cognitively. With AR, the digital information appears to become part of the real world, at least in the user's perception. Achieving this connection is a grand goal—one that draws upon knowledge from many areas of computer science, yet can lead to misconceptions about what AR really is. For example, many people associate the visual combination of virtual and real elements with the special effects in movies such as Jurassic Park and Avatar. While the computer graphics techniques used in movies may be applicable to AR as well, movies lack one crucial aspect of AR—interactivity. The most widely accepted definition of AR was proposed by Azuma in his 1997 survey paper. According to Azuma [5], AR must have the following three characteristics: Combines real and virtual Interactive in real time Registered in 3D This definition does not require a specific output device, such as a head-mounted display (HMD), nor does it limit AR to visual media. Audio, haptics, and even olfactory or gustatory AR are included in its scope, even though they may be difficult to realize. Note that the definition does require real-time control and spatial registration, meaning precise real-time alignment of corresponding virtual and real information. This mandate implies that the user of an AR display can at least exercise some sort of interactive viewpoint control, and the computer-generated augmentations in the display will remain registered to the referenced objects in the environment. [6]

D. Active Learning

Active learning is generally defined as any instructional method that engages students in the learning process. In short, active learning requires students to do meaningful learning activities and think about what they are doing. As Drew and Mackie [7] state, active learning lacks a universal definition. While Greene [8] said active learning as learning by doing based on hands-on experience, Ernst [9] argues that active learning motivates “students to participate mentally, by whatever method works.” Agbatogun[10] also describes active learning as “anything course-related that all students in a class session are called to do other than simply watching, listening and taking notes”.

IV. METHOD

A. The process of development the Scratch program Learning Media in Computing Science Using Augmented Reality

1. Study for the concept about the Computing science, Scratch program, Augmented Reality (AR), and Active Learning
2. Design the Scratch program Learning Media in Computing Science Using Augmented Reality
3. Evaluate the Active Learning in Computing Science Using Augmented Reality Technology.

B. Step of learning Computing Science Using Augmented Reality Technology

1. Download ‘Hpreveal’ application
2. Scan QR Code or search “ar4learning”
3. Scan to the trigger

V. RESULT

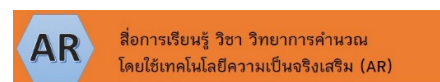
A. The Scratch program Learning Media in Computing Science Using Augmented Reality



Fig. 1. The Main screen of Scratch program Learning Media in Computing Science Using Augmented Reality



Fig. 2. The Main menu of Scratch program Learning Media in Computing Science Using Augmented Reality



ขั้นตอนการใช้งาน

1. ดาวน์โหลด Hp reveal
2. สแกน QR Code หรือค้นหา "ar4learning"
3. เชื่อมไปยังอุปกรณ์

Fig. 3. The QR code and Trigger of Scratch program Learning Media in Computing Science Using Augmented Reality



Fig. 4. The Video teaching of Scratch program Learning Media in Computing Science Using Augmented Reality

B. The evaluation of the Scratch program Learning Media in Computing Science Using Augmented Reality

TABLE I

SHOWS THE RESULT OF EVALUATION OF THE SCRATCH PROGRAM LEARNING MEDIA IN COMPUTING SCIENCE USING AUGMENTED REALITY

no.	evaluation of the Scratch program Learning Media	mean	S.D.	Level of agreement
1	Appropriate with the curriculum.	4.33	0.65	Strongly agree
2	Consistency with students	4.25	0.75	Strongly agree
3	Correspondence with the student's age	4.58	0.51	Strongly agree
4	Conformity with current conditions and problems.	4.33	0.65	Strongly agree
5	Appropriate for student development process	4.08	0.79	Strongly agree
6	Relevance of content	4.25	0.75	Strongly agree
7	Appropriateness of font size	4.42	0.67	Strongly agree
8	Appropriate use of language	3.75	0.62	Strongly agree
9	The suitability of student interests	4.50	0.67	Strongly agree
10	The suitability of the model	4.58	0.67	Strongly agree
11	Appropriate fit with the curriculum.	4.42	0.67	Strongly agree
12	Consistency with nature.	3.67	0.49	Strongly agree
	average	4.26	0.66	Strongly agree

VI. CONCLUSION AND DISCUSSION

The Development of Active Learning in Computing Science Using Augmented Reality Technology. The result were 1) The Scratch program Learning Media in Computing Science Using Augmented Reality and 2) the result of evaluation from five experts of the scratch program learning media in computing science using augmented reality The Scratch program Learning Media in Computing Science Using Augmented Reality and 2) the result of evaluation from five experts of the scratch program learning media in computing science using augmented reality was found at a high level ($\bar{X} = 4.26$, S.D. = 0.66) in countries The study found that learning and teaching based on learning theory. The use of other technology in teaching instruction are also impact on knowledge acquisition. While the teacher using Augmented Reality in education Augmented Reality is not exactly a new technology, but it has only started to make its way into education strategies. With this technology it is possible to overlay reality with a context sensitive virtual world that gives numerous possibilities for educators to enhance the learning experience. With AR books, games, and other teaching materials, students can be immersed in a virtually enhanced world which encourages them to use their imagination and discover the possibilities of the new world, all this while learning new things in a fun and interactive way.

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