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Implementation of VAR (Virtual Augmented Reality) based Educational Games in Harapan Bunda Islamic Kindergartens in Semarang City

Abstract

Due to the contemporary state of game - based learning, the advancement is so rapid that one criterion is that kindergarten children are active playing games on the side - lines of their parents' busy lifestyles; this is absolutely a chance to generate game - based learning that are tailored to the developmental level of kindergarten children, so that educational games are able to be produced. enhance kindergarten children's sensorimotor abilities since this technology may offer virtual and augmented reality that appeals to toddlers and is capable of increasing kindergarten children 's studying enthusiasm, research methodologies based on the ADDIE R & D model (Analysis, Design, Develop, Implementation, & Evaluation) In this second year, product validation was obtained by 91 % of material expertise, 87 % of medium expertise, and 95 % of teacher response, indicating that such a game-based learning product is appropriate for use in kindergarten classroom studies, Based on the findings of the first year, the product has been upgraded appropriately and efficiently accordance to preschool or childhood years cognitive ability, and the average posttest teacher with education game is 84,29, which is in the excellent category.

Keywords: Implementation, Educational Games, Islamic Kindergarten.

Introduction

The advancement of information and communication equipment is continuously accelerating. Human circumstances and actions in their everyday lives changed as a result of this evolution. Technological advancement and communication devices (cellphones) are two rapidly emerging technologies, one of whom is a VAR (Virtual Augmented Reality) oriented game capable of showing exciting virtual things and augmented reality. Mobile technology is being used not just as a form of communication, but rather to assist individuals in their everyday lives. This is feasible since mobile technology provides several services, like as connection to the web, e-mail, organizer, music, videogames, and so on, that can be used anywhere, at any time, and more quickly and easily. (Rahmawati, N.D., Buchori, A., & Harun, L.; 2020, October). On mobile devices, games are a highly popular service. As a result, the game is employed not only as a pleasure service, but also as an educational offering for the participants. Based to Andrini, V. S (2020), a game (gameplay) is a program or software in which one or more participants make options for a defined objective by controlling objects in the game.

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A computer game created using animation technologies and procedures is known as a game. If you want to do the experiment with animation, you must first grasp game development. Or, if you want to build a game, you must grasp animation techniques and procedures since they are intertwined. (Sriyanto, S., et al: 2020). Enjoying educational games guarantees that the hours wasted on the game is not wasted. This type of game usually has laws of the game that push the player to think about whether to complete the game correctly. (Buchori, A., Muhdi, R.A., & Suwarno Widodo, N.F.; 2018). Finally, the writer is faced with the difficulty of creating an instructional game that is both enjoyable and beneficial. In this example, it is the creation of an intriguing conceptual learning game for kindergarten. It is believed that this game will also give beneficial learning opportunities and contribute to the establishment of game - based learning at the kindergarten level in Semarang and adjacent regions. (Siswanto, Y., & Purnama, B.E.; 2013).

This study drew on earlier research, such as those done by Siswanto, Y., and Purnama, B. E. (2013), which found whether the creation of educational video games for Natural Science classes in grade VI primary school kids is extremely enthusiastic in understanding. Then, Yuliyanti, S. (2012) did a research on kindergarten children's basic game - based learning. There's still no level of performance in this game, however if the player completes the game accordance to the directions, there will be a graphic animation or music indicating that the player had completed the game properly. Buchori, A., et al (2017) conducted research on collaborative interactive-based educational media and the object of research is Grade VI classmates of SD Negeri 2 Rowo bungkul in creating a mobile game with an educational concept on an Android smartphone with the topic of mathematics education in grade VI elementary schools. Games may be both enjoyable and educational in terms of numerical knowledge and abilities. As a result, the education process becomes more exciting and less monotonous. Buchori, A., Prasetyowati, D., and Wijayanto, W. (2021) demonstrate that game - based learning based on java heritage are very entertaining to use in classroom instruction, which is supported by Zheng, R., Zhang, D., and Yang, G. (2015), who state that Virtual and Augmented Reality-based games which really support learners understand in the classroom. Depends on the foregoing, certain specifics of the challenges investigated are developed, specifically how to develop and assess the usage of educational games for kindergarten students in Semarang and its environs.

Literature Review

A. Android Smartphone

Learners are required to utilize their cellphones for studying, one of which is Android, in order to keep up with the current studying. Android is a mobile operating platform centered on Linux that contains an operating system, middleware, and apps. Buchori, A., Setyosari, P., Dasna, I.W., and Ulfa (2017) revealed that Android is a programming framework and operational system for mobile devices, centered on the Linux kernel and created by Google and afterwards the Open Handset Alliance (OHA). Based to Meier, R. (2012), the Open Handset Alliance (OHA) is a partnership of 34 hardware, software, and telecommunications firms, including Google, HTC, Intel, Motorola, Qualcomm, T-Mobile, and Nvidia. In teaching process, Android evolves into an operating system for the very first Linux-oriented mobile devices that offer an OPENSOURCE (open) software. This enables it simpler for programmers to design programs. Many applications for Android may be created, one of that can be utilized as an educational media. As a result, academics seek to use Android as an appropriate learning medium.

Ibrahim, N., and Ishartiwi, I. (2017) propose that Android's characteristics are as follows: 1) Complete (complete platform), developers may create the Android platform in a comprehensive manner. Android is a secure operating system that offers several instruments for developing applications and creating chances for software programmers. 2) Android is an open (open source platform), Linux-oriented Android that is open source or open-source, allowing anybody to readily build it. 3) Free Development Platform, Android is a free development platform. There are no licensing or royalty payments to pay. Android software as a comprehensive, open, and accessible framework, and several other information, may be obtained for free from the website http://developer.android.com 4) The popular operating system, Android smartphones were unmistakably distinctive from of the iPhone Operating System (IOS), which is exclusive to Apple's gadgets, since Android has numerous producers, with their core products available at reasonable costs.

Meanwhile Android's weaknesses are as follows: 1) Android has always been engaged to the internet. This smartphone runs on the Android operating system and necessitates a constant internet connectivity. 2) The number of adverts displayed in an up or down program. This commercial is highly unpleasant, despite the fact that it has no impact on the software getting used. 3) It does not save battery power. Augmented Reality technology is currently being

widely used, notably in education. The application of augmented reality equipment in education, according to Billinghurst (2002), is still being investigated since it is unlike computer technology. The augmented reality interface may connect users, virtual things, and actual surroundings, and collaboration between instructors or guides and researchers in the area is required to establish the compatibility about the utilization of augmented reality multimedia with the education system.

B. Game Education

An instructional gamification is the application of educational game built designed for learners that is based on digital augmented reality and may present augmented reality that is relevant to students. This point of view is compatible with Kaufman's (2000) assertion that, since the costs of instructional concepts, applications, technology, and hardware have reduced, the use of small-scale augmented reality technology for academic institutions is becoming very practical throughout this century (Assuming a cautious degree of long-term growth). Moreover, in order to truly boost educational attainment, the possibilities of new technology must be carefully considered.

Azuma (1997) also demonstrated the motivations for using augmented reality technology in the field of education, which are as follows: (1) facilitating communication among both real and virtual environmental conditions, (2) the use of integrations that appear real for motion control, and (3) Learner accomplishment for peaceful implementation of real and virtual items in actual situations. The following studies are important to the study that researchers will conduct: as stated by Buchori, Achmad (2017). Students at PGRI Semarang University use mobile augmented reality interaction with waterfall methodology to master geometry in university are keen to utilize augmented reality on a mobile device to learn geometry lesson content. Furthermore, Ronald T. (1997) suggested that augmented reality might increase pupils' spatial abilities with additional actuality. Additionally, Permadi, D., and Rafi, A. (2015) said that creating a Structure Of investigation so conceived of Social Media Involvement for Mobile-Based Augmented Reality Games can help students improve their talents. Zheng, R., Zhang, D., and Yang, G. (2015), on the other hand, demonstrated that a Review of Augmented Reality. It demonstrates that integrating online and augmented reality made the lesson entertaining by simulating viewing the actual environment.

Methods

This research method is known as research and enhancement. Which refers to research methods used to create specific goods and assess their efficacy (Sugiyono, D.; 2013). The ADDIE learning design paradigm is used in the research model. As the name indicates, this model comprises of five major phases: (A) analysis, (D) design, (D) development, (I) implementation, and (E) valuation. The ADDIE model's divided into five stages that must be conducted out consistently and methodically (Sukmadinata, N.S.; 2013).

Figure 1 depicts the study approach that employs the five stages of ADDIE Model advancement:

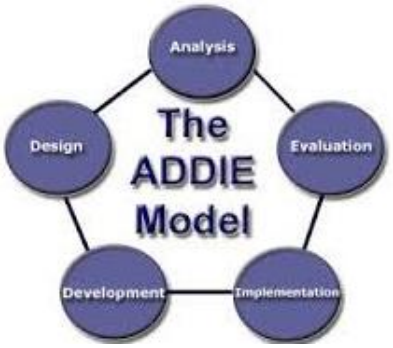

Figure 1.

ADDIE Model

Preliminary Studies

Analysis

According to Sukmadinata, N.S. (2013), the analysis process involves two stages: Impact analysis, performance measurement, and requirement assessment. The first phase, known as performance measurement, is carried out to assess and explain whether the execution challenges identified necessitate a cure in the form of programme deployment or organizational growth. While the requirements analysis is a step in the second phase that is necessary to determine the qualities or competencies that learners need to acquire in order to improve their learning achievement.

Design

This stage necessitates a definition of the educational program's structure in order for an organization to fulfill the intended educational objectives (Sukmadinata, N.S.; 2013). What is accomplished in product development is the following stage of the ADDIE model, namely design. In this step, it is vital to clarify the

education program that has been developed in order for the program to meet the expected educational objectives.

Development

This stage of development entails producing, purchasing, and altering learning media to meet predefined educational objectives. according to Sugiyono, D. (2013) In other terms, improvement phases include the process of finding and creating appropriate techniques, mediums, and classroom practices for delivering personal content. The required framework will be reached at this stage of development in order to offer a product that can be implemented. During the creation stage, Android-based educational media will be generated in compliance with the content; after done, the Android-based medium would be verified by the validator by experts and professionals and material professionals to gather input and assess in accordance with the validator's comments. Additionally, in order to enhance the product, the Android-based media is drastically updated in response to the validator's comments.

Implementation

Implement educational programs by putting learning program designs or requirements into action. According to Sugiyono, D. (2013), the primary objective of the implementation step, which is the step of recognizing design and implementation, is to direct learners to achieve educational objectives, focus on ensuring measures to resolve educational objectives gaps encountered by learners, and concentrate on ensuring that by the completion of the education programme, students have the necessary competence-based knowledge, abilities, and behaviors. Researchers used Android-based learning media with instructional games on animal material throughout the deployment step.

Evaluation

The ADDIE model's final stage is to evaluate learning programs and learning results. The assessment process, like the analysis step, begins with defining competency in terms of understanding, abilities, and mindsets. This is referred as formative assessments. It can also be calculated by evaluating the educational objectives attained by students with the previously established educational objectives (Sugiyono, D.; 2013).

The researcher will analyze the education program as part of this research and enhancement. The assessment comprises the following components:

a. Assessment of the effectiveness of teaching and educational medium depending on the outcomes of the educational medium assessment questionnaire distributed to specialists, material specialists, field specialists, and trial participants. This feedback could be utilized to help revise the learning materials.
b. Examine the impact of employing instructional resources on learners' problem-solving abilities when working on posttest questions. This evaluation serves as background information for the use of Android-based educational media in the virtual classroom teaching - learning activities, which employs game-based learning. Following the completion of this analysis, it will be discovered how beneficial the learning program with virtual augmented reality-based instructional gaming medium in animal learning is.

Results and Discussions

In this research, the ADDIE development methodology involving five stages was employed to yield the following research findings:

1. Analysis

According to Sukmadinata, N.S. (2013), the analysis. While the needs analysis is a phase in the second phase that is required to discover the abilities or competences that learners need to learn in order to enhance their learning accomplishment

The analysis process involves two stages: impact assessment or performance analysis and needs analysis. The first step, termed performance analysis, is conducted to determine and explain if the execution challenges discovered necessitate a change in the kind of program deployment. or organizational development. There has been an in-depth assessment of the performance of the TK TUNAS and TK PGRI 37 Semarang instructors who teach animal material in the performance analysis, which demonstrates that so far no teacher has employed VAR-based educational games during the Covid-19 epidemic, so gae media is very important. This educational activity assists pupils with virtually learning the topic of animals and their varieties.

In the second stage, the needs analysis according to Sukmadinata (2013) is a phase in the second phase that is required to discover the abilities or competences that learners need to learn in order to enhance their learning accomplishment. What is evident is that learning media capable of producing animal material is

essentially packaged and allows pupils to practice understanding various animals in an exciting and organised manner.

2. Design

This stage necessitates a definition of the educational program's structure in order for an organization to fulfill the intended educational objectives (Sukmadinata, N.S.; 2013). The third step of the ADDIE system, design, is achieved through product development. It is critical to define the education program that has been designed throughout this phase in order for the program to accomplish the intended educational objectives.

In creating educational game products depending on virtual augmented reality, animal content was generated in a group by the UT principal investigator and guided by IT professionals beyond the UT so there would be great teamwork with the UT research company to construct a design and content conceptual model that is estimated in creating educational game material, after which captured by IT specialists who are proficient in their fields after the educational game work is completed for about 3 months The device is now at the third stage, which is improvement, based on the recommendations from the first year research.

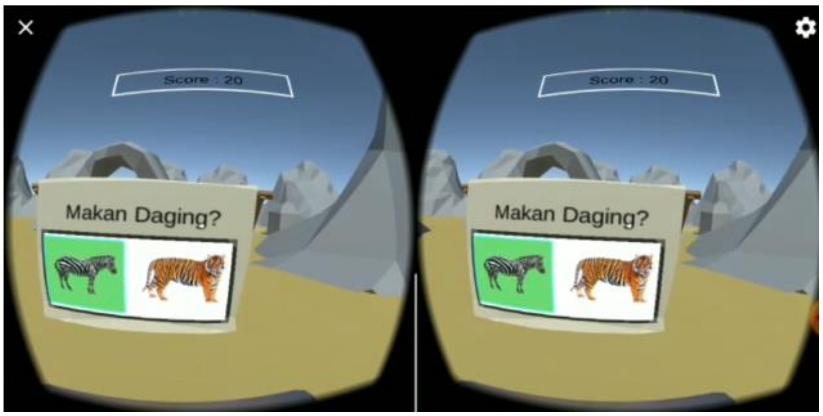

Figure 2.

Educational game design after revision

3. Development

This stage of development entails producing, purchasing, and altering learning media to meet predefined educational objectives. According to Sugiyono, D. (2013 on the other hand, project phases include the process of finding and creating appropriate techniques, mediums, and instructional methods for delivering personal content. The required framework will be reached at this stage of development in order to offer a solution that can be implemented. During this stage of development, the virtual geometry lab business is first examined by professionals, specifically material specialists and media experts, to guarantee that the game - based learning product based on virtual augmented reality is feasible before it is introduced in Harapan Bunda Kindergarten.

During the development stage, digital laboratory-based educational medium will be created in conformance with the content; once completed, the Smartphone-based media will indeed be reinforced by specialists and substance specialists by the assessor to obtain feedback and review in accordance with the validator's constructive feedback. As a result, the smartphone-based media is modified in response to validator comments in order to improve the product. The following information was gathered with the help of two reviewers who are experts in the domains of early childhood development and educational technology:

Table 1.

Experts in instructional media that have been validated

Expert in the media	Aspect of applicability	Aspect of originality	Aspect of creativity	Aspect of visual communication
Validation score	87%	85%	92%	85%

According to the table above, this virtual augmented reality centered educational game medium received a mean score of 87 %, indicating that it is very appropriate for application in studying animal material in kindergarten in Semarang city.

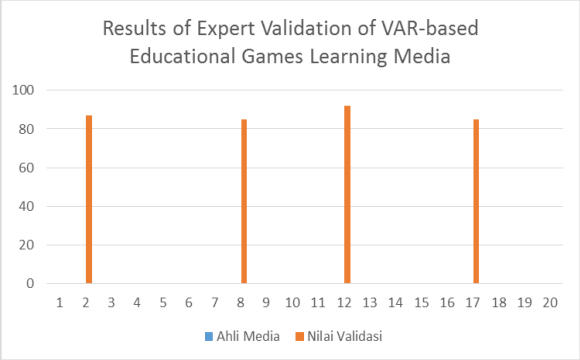

Figure 3.

Experts in instructional media that have been validated

The expertise evaluation of teaching materials was then proceeded, and data was gathered indicating that the VAR-based educational game media was feasible to utilize, allowing educational game media goods to be applied effectively.

Table 2.

Experts in instructional media that have been validated

Material expert	Substansional material aspect	Language aspect
Validation score	88%	96%

The overall average score derived from the table above is 91 %, indicating that the content in the virtual medium of the animal material is extremely suitable for use in kindergarten animal studies.

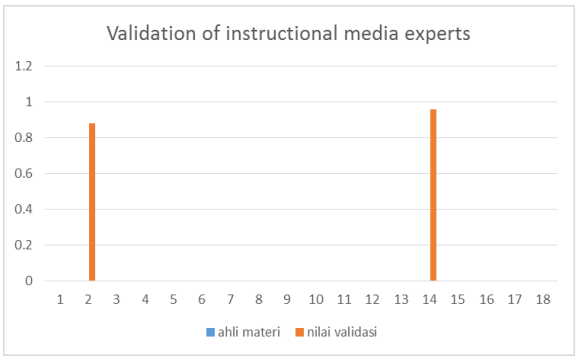

Figure 4.

Expert validation of learning materials

Afterwards, continuing with the evaluation of material specialists to allow for the adequacy of the material's content, so that educational gaming media products for kindergarten children can be materially employed.

4. Implementation

Develop educational programs by putting learning design phase or requirements into action. As stated by Sukmadinata, N.S. (2013) The primary purpose of project execution, which is the phase of recognizing concept and development, is to steer learners toward educational goals, to ensure that mechanisms are in place to address instructional effectiveness gaps observed by learners, and to ensure that at the conclusion of the learning course, educators have the necessary competence-based understanding, abilities, and behaviors.

Researchers used Android-based digital learning tools with educational games on animal theme material throughout the deployment stage.

Figure 5.

Extended test at kindergarten Harapan Bunda Semarang by the research team

In animal material learning has been carried out offline with health protocols which run smoothly followed by more than 7 teachers from Kindergarten A and Kindergarten B classes kindergarten Harapan Bunda Semarang.

5. Evaluation (Evaluation)

The ADDIE model's final stage is to evaluate learning programs and learning results. The assessment process, like the analysis step, begins with defining the competency of knowledge, abilities, and attitudes. This is referred to as formative evaluation. Furthermore, it can be determined by comparing the educational objectives attained by students with the previously established educational objectives (Sugiyono, D.; 2013).

The instructors were requested to submit the required questionnaire with Google form after experiencing the use of virtual augmented reality-based educational games by the teacher. The results revealed that more than % of

kindergarten teachers completed the questionnaire. Harapan Ibu Semarang were really eager about participating in face-to-face learning with health practices. comprehension of animal issues and the posttest teacher grade from Harapan Bunda Kindergarten Semarang is 84,29, which is in the excellent category.

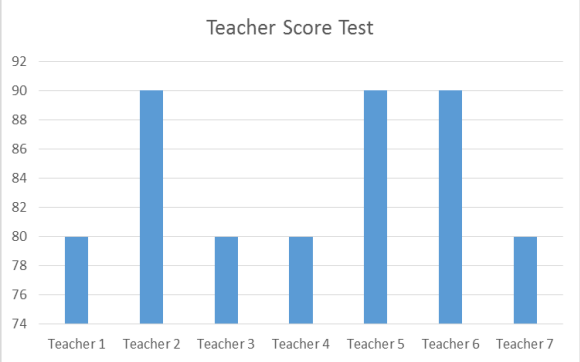

Figure 6.

Score post test teacher from kindergarten Harapan bunda semarang

Conclusions

a. Educational game products based on virtual augmented reality have been produced that can be used in public and private kindergartens, especially in the city of Semarang.
b. The program has been professionally evaluated and has acquired a very positive response from participants such as instructors, media professionals, and learning material professionals, as well as a solid academic score.
c. Educational game products based on virtual augmented reality are ready to be sold massively, especially in the Semarang and surrounding areas because they can increase children's motivation and motor skills.

Suggestion

It is recommended that educational gaming products based on virtual augmented reality be mass-produced and available for use by all Kindergarten teachers and students at any time and from any location so that learning becomes fascinating and enjoyable.

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