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Learning Three-Dimensional Shapes in Geometry Using Mobile-Based Augmented Reality Field and their underlying definitions are presented in this paper

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Abstract

Acquiring knowledge of three-dimensional (3-D) shapes in geometry is crucial for enhancing students' spatial skills. However, some math professors still believe that teaching children about three-dimensional shape is a challenging subject for them to learn. This is especially true for students in Indonesia. In order for teachers and students to grasp the concept of geometry more quickly, an other medium that can aid in the learning process is needed. In order to better understand students' spatial learning activities, the current study aims to employ mobile-based augmented reality (AR) as a medium that can help junior high school teachers and students, in particular, understand the notion of three-dimensional shapes in geometry. The study's findings show that employing augmented reality on a mobile device can improve students' spatial learning.

Keywords—Augmented reality, geometric shapes, mobile-based, spatial ability, three-dimensional shape.

1 Introduction

This concept introduces students to recog- nize geometric objects, problem-solving abilities, and other mathematical abilities [1]. These abilities are vital in human life. Geometry appeals to visual, aesthetic and intui- tive senses, which are intimately connected with the development of mathematics [1]. Geometry is one of the practical elements in mathematics. Studying geometry suits to improve one's mathematical abilities [1]. Learning geometry is also considered as an important activity to improve spatial ability. Spatial ability is the ability to generate, retain, retrieve, and transform well-structured visual

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patterns. It is an essential compo- nent of human intelligence and it hugely influences Science, Technology, Engineering, and Mathematics (STEM) domains [2]. It might offer a fresh viewpoint on areas as well as a means of understanding and considering the real world. It is challenging to acquire this capacity, despite the fact that it is one of the fundamental human capacities. Numerous studies demonstrate that giving pupils geometry learning exercises is a highly effective way to raise their performance on tasks requiring spatial abilities [3]. However, these tasks typically call for the ability to create and work with two-dimensional (2-D) objects to create three-dimensional mental imagery, which could be challenging for certain people.pupils [4]. In addition, it's commonly believed that geometry and mathematics are among the hardest topics and that few students enjoy studying them [5].

In the past ten years, technology has had an impact on the learning process.

Today's cell phone technology is advancing very quickly [6] and is widely utilized by practically everyone, including pupils in schools, globally. Students are typically used to using the advanced technology in their cell phones, like An-droid, to take pictures. But most of the time, people just use it for fun things like gaming, visiting video websites, or snapping selfies [11]. Thus, it can be claimed that although cell phones can be used for learning processes, their use for such purposes is still restricted. By taking these benefits into account, a tool to support geometry learning can be developed, hopefully assisting pupils in overcoming their comprehension challenges. This study demonstrates a particular kind of mobile-based augment

2. Literature Review

2.1 Geometric three-dimensional shapes

Some students still struggle to understand the notion of volume and surface areas of three-dimensional structures in geometry ([12]; [13]; [14]). This is evident when calculating the volumes and surface areas of cylinders, prisms, pyramids, and cones, among other shapes. The majority of students still struggle to comprehend basic geometrical ideas. Students find it challenging to visualize the entirety of three-dimensional shapes because most teachers only use traditional media or books to teach these concepts. This is especially true when they need to observe and calculate the inner side, diagonal, and space diagonal of a particular shape. 3-D forms are frequently encountered ln daily life; so, students ought to already be familiar with the idea of 3-D shapes. In Indonesian schools, students study three-dimensional shapes in geometry since they need to understand this idea in order to recognize geometric objects in real life.

2.2 Accurate spatial perception

The spatial ability, or the capacity to analyze geometric spaces, is the capacity that arises from learning geometry. Students need to possess this fundamental skill [15] in order to effectively engage and adjust to their environment. Effective management of the teaching and learning processes is necessary to foster this skill. However, in practice, educators lack the necessary skills to relate geometry to real-world applications [16]. Furthermore, a lot of Indonesian pupils struggle to comprehend this idea. One aspect of spatial ability is the comprehension of three-dimensional shapes. Students who are able to identify three-dimensional shapes and their components are demonstrating mastery of this ability.

2.3 Digital reality

The actual world and the virtual world are combined via augmented reality (AR) technology ([18]; [19]; [20]). AR is being employed in many scientific and training domains where simulations are necessary. AR has also been applied to education, ranging from primary to postsecondary education. AR has been shown in numerous studies to improve students' motivation and attention spans [21–23]. Through the developed virtualization, augmented reality (AR) enables users to perceive the actual situation [24]. Although one of augmented reality's benefits is that it can enhance the quality of learning, its application in educational procedures is still rather limited. universities as well as schools. Furthermore, schools with restricted laboratory equipment might use it especially.

The study's use of mobile-based augmented reality (MB-AR) is the outcome of earlier researchers' work. There are two components to this MB-AR: a magic book and a droid-based program that is stored on cell phones. A camera phone can be equipped with an Android program called MB-AR, which identifies the markers on the magic book. Conversely, students can utilize the magic book as a reference when learning 3-D shapes in geometry. Students can use a camera that is attached in the classroom to highlight the anime image when they wish to see an illustration of 3-D forms based on the content they learn.

3 Techniques

This project aims to integrate augmented reality media on mobile devices into middle school math instruction. A teaching tool for the concept of 3-D shapes is MB-AR. This study explains how MB-AR media was developed and why it's been deemed suitable for usage in educational settings. The media has been evaluated by media specialists and subject matter experts, and student tests have been conducted beforehand. In Bandung, Indonesia, 150 junior high school pupils have used the MB-AR

media as part of their educational process. All pupils are observed when they are studying 3-D shapes in geometry in order to identify their spatial learning activities. The components that are examined in this learning observation are how students analyse

3.1 Augmented reality media on mobile devices

Analyzing the user, content, software, and hardware is the first stage in creating MB-AR that may be used in learning processes. Next come planning, developing, and testing [25]. The purpose of user analysis is to identify the traits of users who will utilize MB-AR in the future. It is done to determine whether the users' preferences are met by the AR display design, whether the users are interested in the AR display, and whether using the AR would provide any challenges for the users. Whether the content is in the form of a text, image, video, or another format, the goal of material analysis is to determine which format is best for MB-AR display.

3.2 Activities for students' spatial ability

An overview of how children learn in classrooms using MB-AR is obtained based on its implementation at schools. This learning exercise falls within the category of students' spatial competence, which is examined by classroom observations made in accordance with observation criteria. Table 1 shows the learning activities completed by the students.

4 Recognition

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5. Conclusion

The study's findings support the conclusion that all of the students' observed spatial learning activities, which include the following: the capacity to analyze geometrical characteristics; the capacity to construct mathematical arguments; the capacity to recognize, categorize, and compare geometric objects; the capacity to transform and use media in a methodical manner in order to analyze mathematical situations geometrically; and the capacity to visualize, think spatially, and model geometric concepts in order to solve problems, are all on the rise. This suggests that students' spatial learning activities have grown as a result of the effective deployment of MB-AR.

References

Jones, K. (2002). Issues in the teaching and learning of geometry. In Linda Haggarty (Ed) Aspects of teaching secondary mathematics: perspectives on practice. London: RoutledgeFalmer.https://eprints.soton.ac.uk/13588/1/ Jones_teach_learn_geometry_2002.pdf

J. Wai, D. Lubinski, and C. P. Benbow, “Spatial ability for STEM domains: Aligning over 50 years of cumulative psychological knowledge solidifies its importance,” J. Educ. Psy- chol., vol. 101, no. 4, pp. 817–835, 2009. https://doi.org/10.1037/a0016127.

Y.-T. Liao, C.-H. Yu, and C.-C. Wu, “Learning Geometry with Augmented Reality to En- hance Spatial Ability,” in 2015 International Conference on Learning and Teaching in Com- puting and Engineering, 2015, pp. 221–222. https://doi.org/10.1109/latice.2015.40

Telima Adolphus, “Problems of Teaching and Learning of Geometry in Secondary Schools in Rivers State, Nigeria,” Internationa Journal of Emerging Sciences., vol. 1, no. 2, pp. 143– 152, 2011. https://www.stir.ac.uk/research/hub/publication/510419.

H. Baytiyeh, “Students’ Use of Mobile Technologies,” Int. J. Inf. Commun. Technol. Educ., vol. 14, no. 1, pp. 73–85, Jan. 2018. http://hdl.handle.net/1893/26189.