

Integrating Augmented Reality Applications into Mathematics Teaching**Zeliha Sema HALDAN**Zonguldak Bulent Ecevit University
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With the rapid development of technology, there have been some changes in education and training environments. These changes have become obligatory to reflect on both the teaching programs and the methods and techniques teachers use in the classroom. This necessity makes itself felt more in mathematics lessons. Particularly, difficulties arise from students' studying three-dimensional objects in two-dimensional environments. One of the technologies that can be useful in overcoming these difficulties is the augmented reality (AR) technology, which has become increasingly popular in recent years. AR is recognized as one of the best technologies that will revolutionize the future of education. Augmented reality combines 2D/3D objects from the virtual world to the real world in real time. With the spread of mobile devices, many people can now access augmented reality. The growing popularity of AR applications with location awareness is a result of recent advances in mobile technology. The inclusion of AR in the teaching and learning of mathematics can help students visualize how changes in a structure immediately affect some properties. Many topics in mathematics teaching are suitable to be combined with augmented reality materials to assist the learning process. AR technology can significantly increase student satisfaction and behavior in education. In order to better understand the potential of this technology, it is necessary to develop materials for teaching mathematics and to reveal its effects. With this study, it is aimed to develop an augmented reality material within the framework of the Waterfall Model for teaching the surface area of the cube and to examine the effectiveness of the developed material. In the research in which the case study method was adopted, the material development process was presented within the framework of the stages (requirements, design, implementation, verification, maintenance) of the Waterfall model. In order to demonstrate the effect of the developed

The International Congress of Educational Sciences and Linguists (ICEL 2022)
29-30 November 2022, The Netherlands

($t_{96} = 1.340, p > 0,05$) the post-test scores ($t_{96} = 8.920, p < 0,05$). In the study, it was concluded that AR supported teaching made a significant difference on students' academic achievement and attitudes.

Keywords: Maths Teaching , Enhanced Reality, Unity 3D, Middle School Students.