**CALAR (CALCULUS WITH AUGMENTED REALITY): ANDROID BASED APPLICATION TO IMPROVE SPATIAL ABILITY IN CALCULUS LEARNING**

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**ABSTRACT**

Mathematics is a field of science that has an important role in education for sustainable development. Calculus is a very important branch of mathematics and is widely applied to other branches of science. However, a survey of mathematical abilities conducted by the Program for International Student Assessment (PISA) on 80 countries in 2018, stated that the mathematics score of Indonesian students was only 379 points with an average score of 489 points. This shows the low mathematical ability of Indonesian students which causes problems related to the Sustainable Development Goals (SDGs), namely the quality of education (goal 4). The use of AR in learning, especially mathematics, can help students visualize lesson concepts. This paper proposes CalAR as an Android-based AR application as a technological innovation to improve students' spatial abilities in learning mathematics, especially calculus. The method used in this research is RnD (Research and Development). The results of the needs analysis stated that 62.5% of students had difficulty understanding mathematics when learning online. 62.5% of students chose calculus as a difficult subject. 45% have difficulty understanding graphic concepts. In addition, in learning media that attracts 50% of students, they answer AR-based applications. The results of the evaluation of media experts obtained a percentage of 89.7% with a very decent category. While the results of the evaluation of the two material experts obtained a percentage of 83.15% with a very decent category. By visualizing how the concept of calculus works, this application has the potential to further enhance students' understanding of calculus. This application is also a form of support for government programs in providing adequate facilities and infrastructure to support educational success. In its implementation, the government can work together with schools to be able to use this application in the learning process in the classroom. The use of AR in calculus learning media can also be implemented in existing learning applications, so that startups engaged in education can contribute more in helping to improve the quality of education in Indonesia.

***Keywords:*** Android Apps,Augmented Reality, Calculus Learning, Spatial Abilities.