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## Trend and Visualization of Virtual Reality & Augmented Reality in Physics Learning From 2002-2021

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### ABSTRACT

Augmented Reality (AR) & Virtual Reality (VR) are now wide open to all fields. The objectives of this study are to analyze the comparison of trend research on the top 200 cited AR and VR publications in all areas, to identify the comparison of trend mapping visualization on AR and VR publications in Physics learning research, to compare the top 10 most productive author of the AR and VR in Physics learning research, to determine the top-cited author, subject areas and affiliation of the AR and VR in Physics learning research, to analyze the comparison of the distribution of AR and VR publications in Physics learning research. This research analyzes bibliometrics on 'AR' and 'VR' keywords as general fields and specifies it to implement AR and VR in Physics education and compare them. The metadata gathered is from the Scopus database and investigated by VOSViewer. This research shows that the trend of research in AR and VR in all fields is increasing each year. The top keywords used in AR and VR to Physics learning are 'AR' and 'VR', with total link strengths of 479 and 1,882. AR and VR can be integrated into the classroom from toddler to secondary school. Implications of the review of the top 10 cited publications require more improvement and optimization of AR and VR stability.

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### Introduction

Using emerging technology in the education process nowadays is necessary. Technology is changing much faster than ever, so technology-related skills need to be developed early in education (Hashim, 2018; Kuppusamy, 2020; Putranta et al., 2021; Tilhou et al., 2020). Technology and education are necessary elements of the academic system (Dzuranin et al., 2018; Grippa et al., 2018; Van de Oudeweetering & Voogt, 2018; Williams, 2019). Integrating practices and technologies can impact the future development of education, such as Augmented reality (AR) technology, student achievement analysis, educational applications of machine learning/artificial intelligence, open education resources, and adaptive learning technology (Yan, 2021).

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**Keywords:** Augmented Reality, Bibliometric, Physics Learning, Virtual Reality

## Abstract

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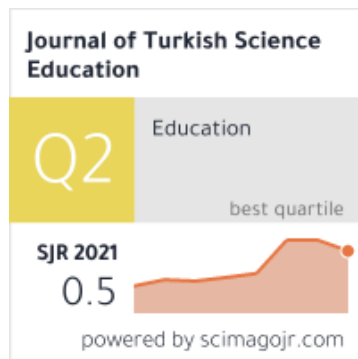
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