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Virtual Reality in Primary Education: Analyzing Subject Focus, Emerging Challenges, and Research Approaches – A Systematic Review

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ADMINISTRATIVE INFORMATION

Support - No external support was received.

Review Stage at time of this submission - Completed but not published.

Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 24 April 2025 and was last updated on 24 April 2025.

INTRODUCTION

Review question / Objective The objective of this systematic review is to investigate the application of Virtual Reality in Subject Focus, Emerging Challenges, and Research Approaches in primary school.

Condition being studied The findings show that VR is most used in STEM (42%), Physical education (9%), biology, and 3D modeling (4%). Other subjects, such as language learning (7%), Art (9%), History and culture (9%), writing(4%)are less represented, suggesting a need for more exploration. Regarding research methods, 56% of studies were quantitative, 23% qualitative, and 21% used mixed methods. The latter offers potential for more valuable insights into VR's application in education. However, challenges such as high hardware costs and content development remain significant barriers, affecting accessibility.

METHODS

Participant or population Students in primary education settings.

Intervention Virtual Reality.

Comparator N/A.

Study designs to be included All study designs that meet the predefined inclusion criteria will be considered for inclusion in this review.

Eligibility criteria The title and abstract must meet the requirements of this study and be published in English in original research and journals between 2020 and 2024. At the same time, the article field must focus on primary schools and students, and open access can be used to download the full text.

Information sources Web of Science and Scopus databases.

Main outcome(s) The findings show that VR is most used in STEM (42%), Physical education (9%), biology, and 3D modeling (4%). Other subjects, such as language learning (7%), Art (9%), History and culture (9%), writing(4%)are less represented, suggesting a need for more exploration. Regarding research methods, 56% of studies were quantitative, 23% qualitative, and 21% used mixed methods. The latter offers potential for more valuable insights into VR's application in education. However, challenges such as high hardware costs and content development remain significant barriers, affecting accessibility. The paper recommends focusing on VR's use in humanities, fostering interdisciplinary collaboration, and creating a VR resource library. Additionally, it suggests establishing a professional development system for teachers, leveraging TPACK-VR (Technology, Pedagogy, and Content Knowledge for VR). Addressing these challenges will help integrate VR more effectively into primary education and enhance its benefits across various disciplines.

Quality assessment / Risk of bias analysis This paper reviews 39 studies from 16 countries (2018-2024) using Web of Science and Scopus databases and applies the PRISMA framework for systematic analysis.

Strategy of data synthesis This study collects and consolidates research from the past few years in an attempt to answer the questions of this study. This review reviews the views of the included literature, explores the disciplines that have focused on the application of VR in primary education in previous studies, and focuses on the research methods used in the study of VR in primary education, as well as the new challenges and difficulties identified in previous studies. In order to obtain a clearer and more convincing analysis, the authors sorted the included articles before inclusion, collating a large amount of data from 39 papers. After obtaining the consistency code of the review of the paper, the validity of this review is even more highlighted. In addition, in order to obtain a broader perspective, this study collects and analyzes published research articles. According to the generality and relevance of the data, the topics were summarized and the content was classified. Finally, after reviewing these 39 articles, three preset coding processes were mainly completed: the subject distribution of VR in primary schools, the challenges faced by VR in primary education, and the research methods mainly applied in VR research. This paper reviews 39 studies from 16 countries (2018-2024) using Web of Science and Scopus databases and applies the PRISMA framework for systematic analysis.

Subgroup analysis No subgroup analysis is planned.

Sensitivity analysis No Sensitivity analysis is planned for this review.

Country(ies) involved CHINA, Malaysia.

Keywords Challenges, Primary Education, Subject Focus, Systematic Review, Virtual Reality.

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