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The Role of Virtual Reality to Enhance Learning Motivation: A Bibliometric Analysis

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ABSTRACT

The rapid advancement of virtual reality (VR) technology has sparked interest in its potential use in educational settings. This study investigates how virtual reality could enhance learning motivation using a bibliometric analysis of scholarly works published between 2020 and 2024. The primary objectives are to identify significant research trends, notable works, and emerging subjects in the literature. 300 relevant articles were collected from Scopus, which served as the data source. The analysis was done using bibliometric tools such as VOS viewer. The study focused on co-authorship networks, citation patterns, and phrase co-occurrence in order to map the research landscape. The results demonstrate that interest in VR's potential to raise learning motivation is growing, with interdisciplinary collaborations at foreign institutions playing a significant role in this trend. The significance of integrating technology, creating immersive learning environments, and the psychological impacts of virtual reality on student engagement are highlighted in important findings. Despite the positive advancements, accessibility issues and constraints in long-term impact research were discovered. This research contributes to the body of knowledge currently in existence and offers useful information for academics, educators, and policymakers with its in-depth examination of Virtual Reality's effect on educational motivation. More research is required to close the gaps observed to fully realize the potential of virtual reality in education.

Keywords: *Virtual Reality, Learning Motivation, Educational Technology, Bibliometric Analysis*

1. INTRODUCTION

One of the industries that has been revolutionized by this is education, which is where virtual reality - or VR for short - comes in. According to [1] provides dynamic and interactive content that might increase learning effectiveness, engagement. With increasing numbers of institutions looking to integrate virtual reality (VR) in an effort provide more dynamic and collaborative learning experiences compared to traditional formats, many are leveraging the technology as a way for their students/learners/participants (herein all-inclusively referred to as learners from terminus onward) engage remotely via asynchronous support. Student academic performance and student retention are heavily influenced by learning motivation [2]. According to [3] Traditional approaches in teaching have shown to not be effective at maintaining motivation [4], causing students to become detached and leading to less desirable learning outcomes.

While VR may enhance learning opportunities, it is unclear whether using VR in school results in increased motivation on the part of students to learn. [5] affirm that students who are non-linear or multi-sequential in their learning mode would be less motivated and attain lower academic achievement, which could infer that asynchronous assessments may not be ideal for them. VR has been touted for its potential to boost learning motivation, but as of now there is no systematic video content analysis with respect real data. The findings from these studies must be consolidated, and significant gaps and trajectories in the field should be delineated. It aims to:

1. From the perspective of bibliometric analysis, we discuss how virtual reality can play a role in improving learning motivation.

2. Identify key trends, classic papers as well as emerging topics the field of VR and learning motivation.

Highlight deficiencies in the current literature and suggest ideas for future research.This study contributes to the field of educational technologies by providing a comprehensive bibliometric analysis concerning virtual reality, learning motivation and their potential relations. The results will offer valuable information to researchers, educators and policy makers about currently available VR solutions for education. This study aims to inspire further research and development in using VR for enhancing learning motivation by identifying the limitations and suggesting future work [6].

2. LITERATURE REVIEW

Virtual Reality (VR): Virtual reality is a technology that makes us feel as if we are actually present in any digital or artificial world. It engenders an immersive and participatory multisensory experience for the consumer by providing visual, auditory and haptic stimulus [1]. Platform-specific VR designs are being modified, and its applications in various industries like education, health care systems or entertainment [7] continues to become more omnipresent this is because VR technology improves rapidly. One of the applications in education are interactive learning environments, virtual lab and realistic simulations where Virtual Reality (VR) is used to enhance student knowledge and increase engagement levels. According to [2], student involvement, perseverance, as well as academic achievement are majorly influenced by their motivation of learning.

It hints at those elements - internal and external stimuli that provoke the desire to learn. This is in line with theories of learning motivation, such as Self-Determination Theory (SDT) and Expectancy-Value Theory that accept both inner and extrinsic incentives. Within SDT is the expectations of success and how valuable a task is seen by an individual [4]. Conventional educational environments may struggle to maintain high levels of motivation due to disengagement, lack of relevance and interaction [3].

However, the integration of virtual reality (VR) into educational procedures has shown good results by way or learning experiences. VR's ability to create immersive environments that are compelling can cater for varied learning needs and styles [7]. There are examples of VR, such as demonstrations which can mirror scientific phenomena or historical occurrences and complex processes [8]. Moreover, since VR can be used by multiple users in the same virtual space at once this might enhance collaborative learning and social interactivity [9].

VR extends the limits of learning and dozens of studies have been conducted on how VR impacts student motivation. The use of virtual reality (VR) may lead to a high level of motivation as long as learning is designed to be more entertaining and enjoyable through pure trends, according with the investigation carried out by [10]. VR makes the room interesting, reducing cognitive load and increasing intrinsic (true for instruction) motivation as students are simply more curious - there! In addition, the exploratory characteristics in VR facilitates immediate feedback and activity, increasing some of key components for effective learning and motivation [8]. While these benefits are non-negligible, there are also significant drawbacks including cost and availability as well potential harm to health outcomes for the individual [11]

Bibliometric analysis whereby one part of academic literature is statistically studied. This involves to Identify the importance, models lift and trends in a specific academic domain

bibliometrics by applying statistical approaches [12]. In educational research, an overview of the field can be gained by a bibliometric analysis which would detect prime noticeable studies and predominant topics in that space [13]. Using different software such as VOS viewer [14] to map and display bibliometric data Researchers discover collaborative networks or citation patterns by topic cluster.

3. METHODS

3.1 Research Design

The article you are reading is related to a bibliometric analysis conducted on research regarding Virtual reality (VR) and Learning motivation. Background Bibliometric analysis is a quantitative research method examining scientific literatures through mathematical and statistical methods [12]. This approach is useful in conducting an extensive investigation on the literature of VR and learning motivation since it allows researchers to make sense across a vast array of research by recognizing common themes, regularities and interconnection rences.

3.2 Data Collection

The researcher searched Scopus like most academic publications and this a wide, well known databases. We then build the Boolean keyword string, which would get a broad but focused set of articles with parallels to the above:

Boolean Keyword String:

(TITLE-ABS-KEY ("virtual reality" OR "VR") AND TITLE-ABS-KEY ("learning motivation" OR "academic motivation" OR "student motivation" OR "educational motivation") AND PUBYEAR > 2019)

4. RESULT AND DISCUSSION

In order to include the most current and relevant research, this search string specifically targets papers from the past four years that discuss Virtual Reality (VR) and its effect on learning motivation.

4.1 Conceptual Framework Table

Element	Description
Phenomenon (Phenomenon)	So, what this study in things to consider is more on Virtual Reality (VR) that encouraging of learning motivation. VR is famous for providing meaningful and interactive experience, which shows the promise while using in educational aspect. This research aims to emphasize the influence of virtual reality on motivation in learning experience with students.
Population (Population)	The population for this study is the scholarly articles published and indexed by Scopus that elaborates on VR use as a way to enhance education experience in terms of student motivation. They cover different academic journals and conferences specialising in Educational Technology, Educational Psychology and Computer Science. This sample is crafted to provide the most complete and representative coverage of literature on this subject.
Intervention/Exposure (Intervention/Exposure)	In this research, the exposure corresponds to peer-reviewed studies focusing on VR use and learning motivation. While this study does not include a direct intervention, it serves to review the literature in order to understand how VR has

Element	Description
	been applied and what effect may exist between employing VR and student motivation for learning across ranging educational contexts.
Comparison (Comparison)	All the data is included and explained in detail, since there are no comparison groupcontrol subjects implicit on this bibliometric analysis. But the analysis might also involve comparing research trends - such as how interest in using VR for boosting learning motivation has changed over time. In addition, methodological comparisons are possible by linking different types and forms of how research is used (or not) to best practices.
Outcome (Outcome)	The expected outcomes of this study include: 1. Identification of the main research trends concerning VR in increasing motivation for learning 2. Identifying the productive authors and their main contributions to the field 3. Analysis of highly referenced articles and their effect on literature 4. Main Topics and Common Keywords Describing the collaboration networks among authors, and institutions from nuancing VR with learning motivation research.
Study Design (Study Design)	Study design: A bibliometric analysis using VOS viewer. Bibliometric Data Collection from Scopus Bibliometric analysis of data provided by analytical tools is a well-known and established methodology. Thirdly, the study design involves conducting searches using a Boolean keyword string to collect data, selecting articles based on inclusion and exclusion criteria, as well as coding them into categories finally for analysis via VOS viewer which will allow us to still create network maps so that we can see trends in relationships used within our review. However, validating the study using credible data sources and methods should bolster confidence in its results as done here (as well as ensuring both adherences to established methodology and reporting of intended analyses for replication).

4.2 Detailed Descriptions

1. **Phenomena (Phenomenon**):

What the study is about: how virtual reality (VR) may impact students' motivation to learn Virtual Reality (VR) gives a more immersive and engaging learning experience as opposed to conventional approaches which could with the prospects of increasing motivation, interest by students.

2. **Population (Population):**

Scopus Journal, Virtual reality, VR and incentive to study trend in academic publications. This population was chosen to ensure that the literature studied extends over a wide and representative scope of relevant, contemporary publications so as to provide an in-depth look at research performed.

3. **Intervention/Exposure (Intervention/exposure)**

Describes research Done on [VR usage and Desire to learn] Rather than by direct intervention, the research relies upon a recourse into literature to inquire how virtual reality has been employed in education and its impact on student motivation.

4. **Comparison (Comparison):**

No real control group but will compare different VR teaching styles as well as trends in research over time. This will allow us to follow how passion in addition for creativity

possess grown around implementing VR, by using humanity enthusiasm that can distance education.

5. **Outcome (Outcome):**

   Want to see Virtual Reality Business Research Themes and want to learn Above all, the most active contributors to this topic are high volume writers. The most read articles and their impact Favourite and some common primary subjects Collaborative networks with institutions and writers.

6. **Study Design (Study Design):**

   VOS viewer is used for bibliometric analysis. In order to map and illustrate trends in the literature, the method entails gathering data from Scopus, choosing articles based on inclusion and exclusion criteria, and evaluating the data. Reliability and validity are preserved via the use of reliable data sources, tried-and-true techniques, and thorough research process documentation.

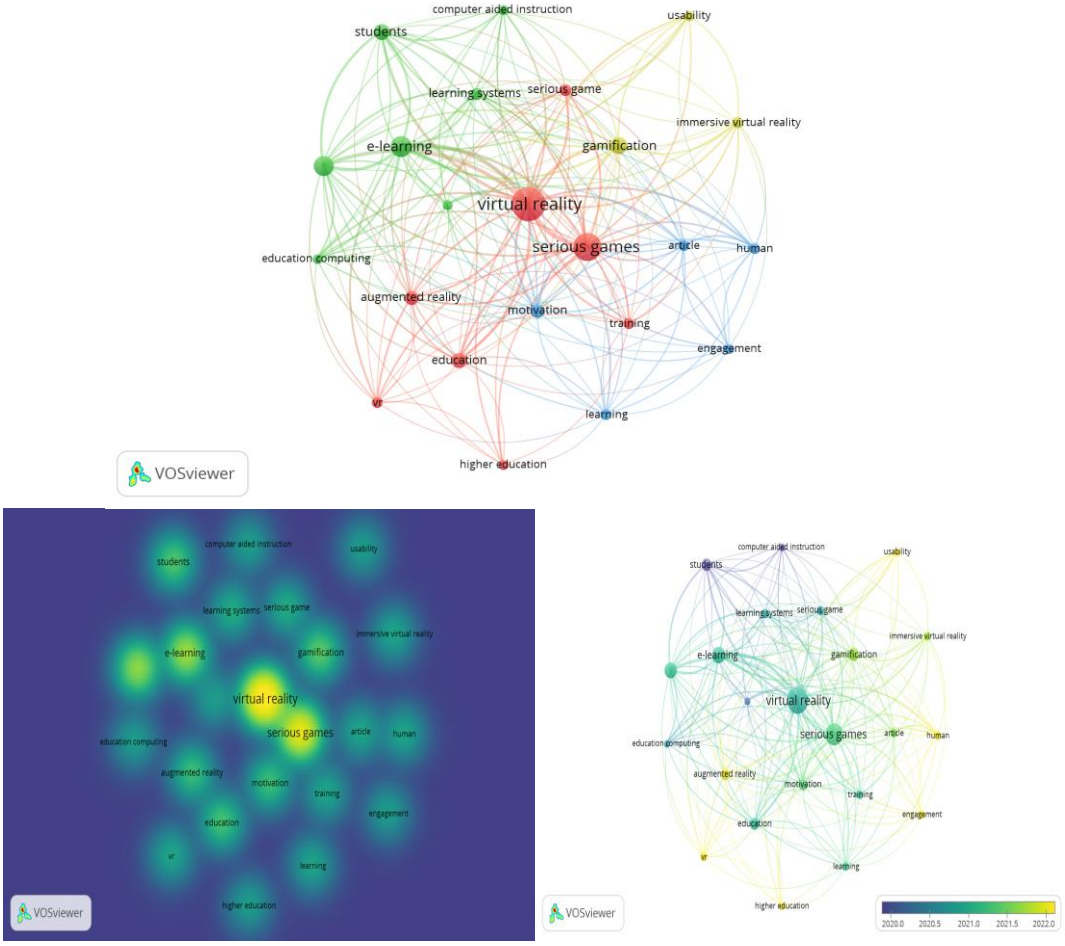

Figure 1. Vos Viewer Network Visualization, Overlay Visualization, Density Visualization

CONCLUSION

In a systematic review and bibliometric analysis on the effect of VR in learners that presents major trends and findings, it is reported that virtual reality (VR) further contributes to motivation by increasing learning associated with a cluster.

1. Interest/Media Coverage In 2020-2024, many publications on virtual reality (VR) and learning motivation were published when compared with previous years. In this pattern we observe the growing curiosity and awareness on how VR can make impact in education where it will approach through increase of motivation & engagement.
2. The input of the study was divers and multidisciplinary there were a wide range in terms of writers contributing for the area Today researchers from various domains, such as educational technology research, psychology and computer science are exploring the role of extrinsic motivators in VR learning.
3. Research Focus: The results of the keyword analysis and theme clustering revealed that four principal topics including "virtual reality," "serious games, e-learning" with Motivation were highlighted. These issues are the main focus of interest among researchers and reflect an emphasis on pedagogical elements related to using VR in education (pedagogy), technical aspects associated with deploying VR technology for educational purposes (technology) as well as psychological considerations that may influence learning outcomes during such interactions.
4. Important publishing venues and important writers: The review identified some of the most common places that are used for disseminating AI ethics research findings as well as key researchers. The journals Sustainability (Switzerland) and JMIR Serious Games are emerging outlets for publication. These insights help discover the primary roots and inspiration matters for most of this field best research work. Collaboration and Geographic Distribution: Analysis of co-authorship/cooperation networks showed strong initiative for cross-institutional collaboration. Several teams of researchers from North America, Europe and East Asia have worked to make a similar important rivalry. Interest in virtual reality (VR) for improving learning motivation has surged, signifying both benefits and issues with the mechanism itself that provide a variance of knowledge to the research.
5. Research Priorities: Despite the positive findings, this assessment also highlighted gaps in research and identified several areas that require additional attention. Examples include increased methodological rigor in psychological research to establish causality; longitudinal studies of VR and learning motivation, including lab-to-life domain generalization issues; the development of guidelines for blending best practices with educational constraints. In conclusion, this paper is a systematic review and bibliometric analysis that systematically analyses the current status of virtual reality technology in cultivating learning motivations for scaffolding to predict future trends. VR has been a very active area of research in use it to create learning environment which are just not more effective but also engaging. Key Takeaways for Researchers, Educators and Policy Makers Seeking to Improve Education through the Use of Virtual Reality, It does so by identifying key trends, presenting important studies and reviewing gaps in the current research.

Virtual reality (VR) has been shown to enhance learning motivation in a number of ways, as shown by a systematic review and bibliometric analysis of the literature that reveals important patterns and discoveries.

1. Growing Interest and Research Activity: Between 2020 and 2024, there were a lot more papers on virtual reality (VR) and learning motivation. This pattern demonstrates the increasing awareness of and curiosity in VR's potential educational uses to raise student motivation and engagement.
2. Diverse and Multidisciplinary Input: Strong multidisciplinary interest was shown by the study, which found a diverse variety of writers contributing to the topic.

Researchers are currently investigating how virtual reality (VR) affects learning motivation from a variety of disciplines, including educational technology, psychology, and computer science.

3. Principal Topics and Research Emphasis Areas: A number of important topics, including "virtual reality," "serious games," "e-learning," and "motivation," were brought to light via keyword analysis and theme clustering. With an emphasis on the pedagogical, technical, and psychological elements of employing virtual reality in education, these issues represent the main areas of interest among the research community.
4. important writers and Leading Journals: Important publishing venues and important writers were identified by the review. Journals such as Sustainability (Switzerland) and JMIR Serious Games have become important channels for sharing research results. These observations aid in identifying the key sources and influential contributions for this field's top-notch research. cooperation and Geographic Distribution: The examination of co-authorship and cooperation networks demonstrated robust attempts at collaboration both inside and across institutions. Researchers from North America, Europe, and East Asia made noteworthy contributions to these efforts. The widespread interest in virtual reality (VR) as a means of enhancing learning motivation is indicative of the advantages and problems associated with it, which adds diversity and expertise to the study.
5. Prospective Research Pathways: Notwithstanding the encouraging results, the assessment also identified several research gaps and areas that need further investigation. These include of more thorough empirical research to demonstrate causal linkages, analyses of VR's long-term impacts on learning motivation, and the creation of best practices for incorporating VR into diverse educational settings.

To summarise, the systematic review and bibliometric analysis provide a thorough comprehension of the present situation and prospects of virtual reality in augmenting learning motivation. An increasing amount of research is being done on the use of VR technology to build learning environments that are more effective and engaging. This study provides insightful information for academics, educators, and policymakers who want to use virtual reality (VR) to enhance educational results. It does this by highlighting important trends, significant contributions, and research gaps.

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