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Exploring the Impact of Emotion on Future Sustainable Development Education: Leveraging Virtual Reality Technology

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ABSTRACT

The 2015 United Nations Millennium Declaration identified 17 sustainable development goals (SDGs) and 169 sub-goals. Sustainability has always been an area of great concern. The main purpose of this study is to explore the role of emotion in promoting the innovation of education for sustainable development in the future through virtual reality technology. The main target group of this study is to promote the United Nations Sustainable Development Goal 13 climate change to people in developed regions. The main medium of communication is virtual reality animation video and game interaction, which is convenient for more users to access through online platforms. Participants can work together online to create sustainable animation and game projects. The 3D animation of virtual reality adopts more realistic modeling, lighting rendering, and material rendering. Issues such as deforestation and ocean acidification can be better visualized. People in developed regions may understand sustainable development but they do not have a deep understanding of the importance of the problem. Therefore, this research is dedicated to making people have a true emotional identity through virtual reality technology, and ultimately transforming people's values, behaviors and lifestyles towards sustainable development.

Keywords: *Emotions, Sustainable development, Virtual reality, educational innovation*

1 INTRODUCTION

The sustainable development of education has always been a hot area of research. In the face of increasingly complex environmental challenges and social changes, cultivating students with sustainable awareness and ability has become an important task to promote social progress and sustainable development. However, traditional educational methods are often unable to adequately meet this demand, and innovative educational methods need to be sought to stimulate students' interest, increase their participation and cultivate their creativity.

Emotional education has attracted widespread attention in the field of education. Emotional education emphasizes developing students' emotional awareness, emotional management, and emotional intelligence to promote their holistic development and resilience. In the context of ESD, affective education can help students develop concern for environmental, social and economic issues and stimulate their active participation and innovative thinking.

At the same time, virtual reality (VR) technology, as an innovative educational tool, has shown its potential in educational innovation. Through virtual reality technology, students can participate in various situations personally, thus providing a more immersive learning experience. In sustainable development education, the use of virtual reality technology can simulate real environments and

situations, helping students better understand and experience the principles and practices of sustainable development.

However, although affective education and virtual reality technology have each shown potential in educational innovation, research on their relationship and mutual influence is relatively limited. Therefore, it is necessary to deeply explore the influence of emotion on the innovation of education for sustainable development in the future, and study how to use virtual reality technology to improve the effect of emotion education. Through such research, we can provide education practitioners and policymakers with more specific and effective guidance to promote the further development of ESD and provide students with a more creative and sustainable educational experience.

Education for sustainable development aims to develop students' awareness, knowledge, and competencies on social, economic, and environmental sustainability. In the context of the current global challenges of climate change, resource shortage and social inequality, education for sustainable development is of great significance. It aims to stimulate students' concern for environmental protection, social justice, and economic development, and develop them into global citizens with innovative thinking, problem-solving skills and a spirit of cooperation.

However, traditional educational approaches often fail to fully cover the interdisciplinary knowledge and skills required for ESD. In many traditional classrooms, students are limited to book knowledge and abstract concepts, lacking direct participation and practical experience. Therefore, it becomes crucial to seek innovative educational methods and tools.

As an innovative educational tool, virtual reality technology brings new opportunities for sustainable development education. Virtual reality technology can provide an immersive and immersive learning experience by simulating and recreating real environments and situations. Students can participate in various scenarios and role-plays through virtual reality technology, exploring the principles and practices of sustainable development. This level of interactivity and engagement helps deepen students' understanding and identification with sustainable development and stimulates their interest and motivation.

In this context, the main questions of this study are: How does emotion affect future innovations in education for sustainable development, and how can the use of virtual reality technology enhance the effect of emotion education?

To answer this question, the purpose of this study was to:

Explore the relationship between emotional education and sustainable development education: analyse the impact of emotional education on students' sustainable development awareness and behaviour, and the role and value of emotional education in sustainable development education.

Research on the application of virtual reality technology in education for sustainable development: explore how to use virtual reality technology to provide a more immersive learning experience and promote students' emotional development and sustainable awareness. Analyse the advantages and challenges of virtual reality technology in education for sustainable development.

Research on the integration of emotional education and virtual reality technology: explore how to combine emotional education and virtual reality technology to enhance students' emotional intelligence and awareness of sustainable development. To study how to design and implement a virtual reality teaching program for emotional education, and to evaluate its impact on students' emotional development and sustainable awareness.

By answering these research questions and achieving these goals, this study aims to provide educational practitioners and decision makers with an empirical basis and guidance on emotional education, virtual reality technology, and innovation in education for sustainable development, further

promoting the sustainable development of education, and To develop creative and sustainable minded students.

2 LITERATURE REVIEW

Definition and theoretical framework of affective education. Emotional education aims to develop students' emotional awareness, emotional management, and emotional intelligence to promote their overall development and resilience (Elias et al., 1997;Brackett et al., 2011). According to Goleman's (1995) theory of emotional intelligence, emotional education emphasizes the cognition of emotions, the expression of emotions, and the ability to regulate emotions, as well as the ability to establish positive interpersonal relationships and solve problems. Emotional education also draws on social-emotional theory, emphasizing the importance of social interaction and emotional expression for individual emotional development (Denham et al., 2015). Research has shown that emotional education has a positive impact on students' emotional regulation, learning motivation, and social skills (Sanchez-Nunez et al., 2020).

Definition and Theoretical Framework of Education for Sustainable Development. ESD aims to develop students' awareness, knowledge and competencies on social, economic and environmental sustainability (UNESCO, 2014). According to the definition of UNESCO, education for sustainable development should cover the three dimensions of economy, society and environment, and cultivate students' ability of systematic thinking, global awareness and sustainable action. The theoretical framework of ESD involves systems thinking, principles of sustainable development, and interdisciplinary learning (Sterling, 2001). Previous research has shown that ESD positively affects students' environmental awareness, sustainable behaviour, and social participation (Rickinson, 2006).

The application of virtual reality technology in education. Virtual reality technology enables users to interact and explore the environment immersively by creating a computer-generated virtual environment (Slater & Wilbur, 1997). In the field of education, virtual reality technology is widely used in subject teaching, skill training and immersive learning experience (Pivec & Kronberger, 2016). Research has shown that utilizing virtual reality technology can increase student motivation, engagement, and comprehension (Ho et al., 2019). Virtual reality technology can also simulate real situations to help students better understand and experience the principles and practices of sustainable development (Kearney & Schuck, 2005).

The relationship and existing research among emotional education, education for sustainable development and virtual reality technology. Studies have begun to explore the relationship between emotional education and education for sustainable development and found that emotional education can promote students' awareness and behaviour of sustainable development (Ferreira et al., 2020). In addition, some studies have also explored the application of virtual reality technology in sustainable development education and found that providing immersive learning experience through virtual reality technology can enhance students' understanding and participation in sustainable development (Aldrich, 2009). However, the research on the combination of emotional education and virtual reality technology in education for sustainable development is still limited.

3 METHOD

The research methodology of this study was based on a keyword search of a review of relevant published literature. Review the published literature by searching academic databases (such as PubMed, Google Scholar, Scopus, etc.) and relevant academic journals. Keywords include emotional education, education for sustainable development, virtual reality technology, emotional intelligence, sustainable awareness, etc.

The reviewed literature was screened according to the title and abstract of the literature. First, documents irrelevant to the research topic were excluded. Then, according to the purpose and requirements of the research, select the literature closely related to emotion, education for sustainable development and virtual reality technology.

Extract relevant data from the screened literature, including research methods, sample characteristics, measurement tools, data analysis methods and main findings, etc. Pay attention to record the citation information of each document so that it can be cited in the paper.

Data integration and analysis: Integrate and analyze the extracted data. First, the published literature on the impact of emotion on innovation in education for sustainable development and the potential of virtual reality technology for emotional development and sustainable awareness are collated and summarized. Then, compare and contrast the differences and similarities of the different literatures in terms of research methods, participant selection, data collection and analysis methods, etc.

Discussion and conclusion: Based on the results and analysis of the literature review, discuss the impact of emotion on future innovations in education for sustainable development and the potential of virtual reality technology in promoting emotional development and sustainable awareness. Explore the practical and theoretical implications of the findings and discuss the limitations of the results.

4 FINDING AND DISCUSSION

Through a review and analysis of published literature, this study aims to explore the impact of emotion on future innovations in education for sustainable development and explore the potential of virtual reality technology in promoting emotional development and sustainability awareness. A detailed description of the findings and discussion follows.

The impact of emotion on future ESD innovation: By reviewing the literature, we found that emotion plays an important role in ESD innovation. Affect is closely related to students' sustainable awareness, emotional intelligence and behavioural intention. Research shows that emotional education can improve students' emotional engagement, emotional intelligence, and sustainability awareness (Lee et al., 2019). Students exhibit greater emotional intelligence and emotional regulation during a virtual reality experience in emotional education. They have a deeper understanding of the importance and challenges of sustainable development and demonstrate more environmental behavior and social engagement.

Potential of Virtual Reality Technology to Promote Emotional Development and Sustainability Awareness: A review of the literature shows that virtual reality technology has great potential to promote emotional development and sustainability awareness. Virtual reality technology provides an immersive learning experience that can enhance students' emotional engagement and connection. Through virtual reality situations, students can interact with the environment and experience different emotional states, thereby enhancing emotional intelligence and emotional regulation, thereby promoting the formation of sustainable awareness (Alghamdi et al., 2021). Virtual reality technology provides a platform for students to explore and practice sustainable development issues. They can interact with sustainable development-related situations in a virtual environment, participate in simulated tasks and case studies, and enhance their understanding and emotional engagement with sustainability issues (Katsaliaki & Mustafee, 2015).

Comparing with previous research findings, the findings of this study further emphasize the importance of emotional education and virtual reality technology in ESD. Previous research has pointed to the positive impact of emotional education and virtual reality on students' emotional development and learning outcomes (Alghamdi & Drew, 2021; Lee et al., 2019). The results of this study further corroborate these findings and apply them to the field of ESD innovation.

These findings have important practical and theoretical implications. From a practical perspective, the findings of this study provide guidance for educational practitioners and policymakers on how to effectively use affective education and virtual reality technology to promote innovation in education for sustainable development. They emphasize the potential of emotional education and virtual reality technology in education and provide a basis for designing and implementing virtual reality teaching programs for emotional education.

From a theoretical perspective, the findings of this study provide a deeper understanding of the relationship between emotional education, virtual reality technology, and education for sustainable development. They reveal the importance of emotion to educational innovation for sustainable development and provide a theoretical basis for further exploring the role of emotional education and virtual reality technology in educational innovation.

5 CONCLUSION

This study explores the impact of emotion on future innovations in education for sustainable development and uses virtual reality technology as a research tool to explore the potential of virtual reality technology in promoting emotional development and sustainability awareness. By reviewing the relevant literature and analysing the research results, this study draws the following main findings.

First, emotion plays an important role in future innovations in education for sustainable development. Emotional education can increase students' emotional engagement, emotional intelligence, and sustainability awareness. Through the virtual reality experience of emotional education, students can gain a deeper understanding of sustainable development and show more environmental protection behaviours and social participation.

Second, virtual reality technology has the potential to promote emotional development and sustainable awareness. Virtual reality technology provides an immersive learning experience that can enhance students' emotional engagement and emotional connection. Through virtual reality scenarios, students can interact with the environment and experience different emotional states, thereby promoting the development of emotional intelligence and emotional regulation, and further strengthening the formation of sustainable awareness.

The contributions of the results of this study to the fields of emotion, education for sustainable development and virtual reality technology are as follows.

Provide a new perspective on the theory and practice of emotional education. The findings highlight the importance of emotion for ESD and provide guidance for the design and implementation of emotion education. Through the virtual reality experience of emotional education, students can obtain richer emotional participation and the cultivation of emotional intelligence.

Reveals the potential of virtual reality technology in educational innovation. Virtual reality technology provides students with an immersive learning experience that enhances emotional engagement and sustainable awareness. The results of this study provide an emotional education method based on virtual reality technology, which provides new ways and strategies for educational innovation.

Although this study made some important findings, there are some limitations that need to be noted. First, there may be some bias in the selection of research samples, which limits the generalizability of the findings. Second, time and resource constraints in the study design may have had an impact on the detail of data collection and experimental interventions. In addition, the results of this study may be affected by individual differences and environmental factors, which need to be explored more comprehensively and in-depth in future studies.

Future research can continue to deepen the exploration of the following aspects:

Further study the influence mechanism of emotion on the innovation of education for sustainable development. Through more empirical research, explore how emotion affects students' cognition, attitude and behaviour towards sustainable development, and the relationship between emotion and other educational elements (such as cognition, attitude, etc.).

In-depth exploration of the application of virtual reality technology in emotional education and sustainable development education. Researchers can further explore how to design and implement emotional education programs based on virtual reality technology to enhance students' emotional intelligence, emotional engagement, and sustainable awareness.

Consider the emotional needs of different educational settings and audiences. Future research can focus on students of different ages, cultural backgrounds, and educational backgrounds to better understand their emotional needs and develop corresponding emotional education strategies and virtual reality teaching environments.

Through further research, we will be able to better understand the impact of emotions on innovations in ESD and realize the full potential of virtual reality technology for emotional development and sustainable awareness. This will provide practical and theoretical support for future sustainable development education and contribute to the cultivation of a new generation of leaders with sustainability awareness and emotional intelligence.

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CONFLICT OF INTEREST

There is no conflict of interest in this study.

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