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Article

Research on the Construction of a Cognitive-Psychological Adaptation System for Digital Teaching Empowered by Healing Design

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Abstract: This study constructs a cognitive-psychological adaptation system for digital teaching centered on healing design to address students' mental health and learning efficiency in the contemporary educational environment. By combining theoretical analysis with empirical research, it explores how to integrate healing design concepts into the digital teaching process to improve students' learning motivation and emotional engagement. The research framework clarifies the mechanisms through which healing-oriented visual, spatial, and interactive elements in digital platforms can regulate learners' cognition, emotion, and behavior. Quantitative and qualitative data are used to examine changes in students' anxiety, stress, and perceived support, as well as their attention, persistence, and satisfaction with learning tasks. The results show that healing design can effectively enhance students' learning experience, reduce anxiety and stress, promote positive emotions, and further improve learning outcomes. In addition, the study identifies key design principles, such as emotional safety, cognitive load balance, and supportive feedback, which contribute to a more adaptive digital learning environment. These findings provide theoretical support and practical guidance for optimizing digital teaching and introduce the concept of psychological adaptation into teaching design, moving toward a more humanized, inclusive, and effective educational model that better responds to the psychological needs of diverse learners in digital contexts.

Keywords: digital teaching; healing design; cognitive psychology; mental health; learning motivation; learning outcomes

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1. Introduction

1.1. Research Background

In the context of the accelerating digitalization of education, students face challenges not only in acquiring knowledge but also in managing multidimensional psychological pressures arising from learning tasks, interpersonal interactions, and emotional fluctuations [1]. Psychological well-being in the field of educational psychology plays a critical role in academic development, directly influencing the maintenance of learning interest and eventual academic outcomes. Traditional teaching methods have often overlooked the personality differences and emotional needs of students, leaving some feeling isolated during digital learning. This highlights the urgent need to explore innovative teaching design concepts that enhance psychological adaptability in the learning process. Healing design, which emphasizes emotional experience and mental health, offers a promising approach to addressing these challenges. By integrating perspectives from psychology, pedagogy, and design, it is possible to develop a digital teaching cognitive psychological adaptation system centered on healing design. Such a

system aims to improve learners' emotional experiences, stimulate their enthusiasm for learning, and promote mental well-being. The significance of this research lies in providing theoretical support and practical guidance for enhancing the quality of digital education, optimizing the learning environment, and meeting the diverse needs of students.

1.2. Research Significance

The significance of this study lies in addressing the challenges of mental health and learning efficiency faced by students within educational environments by developing a digital teaching cognitive psychological adaptation system enhanced by healing design principles [2, 3]. The widespread adoption of information technology has increasingly positioned digital teaching as a key focus of educational reform. However, many traditional teaching methods have failed to adequately address students' emotional needs, resulting in diminished learning motivation and heightened anxiety. By incorporating the concept of healing design, this study aims to enhance the learning environment's affinity and comfort, enabling students to experience greater support and care, thereby fostering increased enthusiasm and engagement in learning. This research contributes to the integration of educational psychology, design, and information technology, offering innovative teaching design approaches for educators. It seeks to diversify teaching content and methods, establish a system that provides new perspectives for addressing educational equity issues, and support students in achieving improved psychological adaptation and development within personalized learning environments. Ultimately, this study promotes the overall advancement of education, enhances educational quality, facilitates the comprehensive development of students, and provides a theoretical foundation for educational innovation in the digital era.

2. Current Application of Healing Design in Digital Teaching

2.1. Principles of Healing Design and Cognitive-Psychological Adaptation Characteristics in Digital Teaching

The core principle of healing design is to create environments that promote mental health and emotional well-being through relevant management work [4]. In this process, design elements such as color, shape, layout, and content are selected to reduce users' psychological burden and enhance learners' emotional experience. In digital teaching, healing design emphasizes humanized interface design and personalized learning experiences to provide students with a safe and warm learning space that meets their emotional and psychological adaptation needs. The cognitive-psychological adaptation characteristics of digital teaching are reflected in promoting active learning and deep engagement through flexible teaching methods, immediate feedback, and emotional support. Digital teaching uses multimedia technology and interactive platforms as tools to meet learners' diverse needs in acquiring knowledge and emotional connection, enhancing learning motivation and outcomes. By combining healing design concepts, digital teaching focuses not only on knowledge transmission but also on emotional experience and psychological adaptation, aiming to establish an organic connection between knowledge acquisition and mental health, providing learners with comprehensive support and encouragement. This integration helps improve learning outcomes and promotes the development of students' physical and mental health.

2.2. Analysis of Application Scenarios

2.2.1. Construction of Learner Psychological Profiles and Cognitive Load Tag System

Constructing learner psychological profiles is a crucial process for analyzing individual psychological characteristics, emotional states, and learning behaviors. By systematically studying learners' cognitive styles, emotional tendencies, learning motivations, and coping strategies, a comprehensive and dynamic psychological outline can be developed. This serves as a foundation for the personalized design of digital

teaching. The cognitive load labeling system is designed to classify students' cognitive load during the learning process, enabling effective monitoring of learning pressure, physical condition, and emotional response. The system categorizes cognitive load into internal load, external load, and related load, assisting educators in identifying the challenges and pressures faced by learners and making timely adjustments. When teaching complex concepts, educators can modify the presentation and difficulty of materials to reduce external load, enhance the management of internal load, and ensure the optimal allocation of learners' cognitive resources. By integrating psychological profiles with cognitive load labeling systems, data support can be provided for therapeutic design [5]. This allows the digital teaching environment to more accurately address students' emotional needs and cognitive adaptability, fostering a more supportive learning atmosphere and improving both learning outcomes and mental well-being.

2.2.2. Immersive Learning Environment Design and Personalized Content Delivery

Immersive learning environment design leverages technologies such as augmented reality and virtual reality to create engaging and interactive learning experiences. These environments effectively stimulate learners' senses, enhance interest in learning, maintain attention, and reduce cognitive load and emotional stress. Carefully designed immersive scenarios provide rich visual and auditory stimulation, simulate real-world tasks and situations, and enhance learners' practical application skills [3, 6]. Personalized content delivery is tailored to the psychological characteristics and learning progress of individual learners. Intelligent algorithms analyze learners' needs and preferences, dynamically adjusting teaching content and pacing to ensure the relevance and adaptability of learning materials. This approach significantly enhances learners' ability to learn independently, provides timely support at various stages of the learning process, and improves overall learning efficiency. By combining immersive learning environments with personalized content delivery, digital education can optimize cognitive load, address learners' emotional needs, and offer an effective pathway for educational innovation in the information age.

2.2.3. Learner Learning Cycle Management and Cognitive Efficiency Improvement

Learner learning cycle management is a crucial step in systematically planning and monitoring the learning process. By establishing clear learning goals, timeframes, and feedback mechanisms, learners can effectively organize their activities and optimize their learning paths. This management approach emphasizes controlling individual learning pace and adapting strategies as needed, ensuring learners maintain high motivation and positive emotional states under varying cognitive conditions. Cognitive efficiency improvement focuses on enhancing learners' ability to comprehend and apply information during the learning process. Through diverse teaching methods and tools, learning content becomes more engaging and practical. By integrating data analysis with learner feedback, cognitive load and emotional changes can be monitored in real time, allowing for timely adjustments to strategies. Tools can also schedule appropriate learning intervals and breaks to prevent cognitive overload and sustain optimal learning states.

3. Challenges in Healing Design Empowering Digital Teaching

3.1. Challenges at the Application Level of Healing Design

3.1.1. Homogeneous Design Patterns and Difficulty in Integrating Teaching Characteristics

When healing design is applied in digital teaching, challenges arise due to homogeneous design patterns and difficulties in integrating teaching characteristics [4, 7]. Many digital teaching platforms often rely on fixed templates in their design, which lack innovation and personalized elements. This results in similar user experiences, making it difficult to address the diverse needs of learners. Homogenization reduces the appeal and

interactivity of teaching content and learning activities, thereby diminishing students' interest and weakening the practical effectiveness of healing design. Educational institutions often differ significantly in teaching goals, course content, and student characteristics. Effectively incorporating healing design concepts into their unique teaching frameworks and developing targeted design plans has become a significant challenge. Educators must balance general design principles with personalized teaching requirements, ensuring a seamless integration of design concepts with teaching practices. This is essential for achieving effective healing design. There is an urgent need for educators to adopt creative thinking during the design process, explore best practices, and enhance both teaching outcomes and the overall learning experience.

3.1.2. Insufficient Depth in Exploring Healing Meaning and Transforming It into Teaching

The application of healing design in digital teaching faces challenges due to insufficient depth in exploring its meaning and effectively transforming it into teaching practice. Healing design aims to enhance learners' mental well-being by improving the learning environment and emotional experience. However, in practice, many educators lack a comprehensive understanding of the deeper significance of healing design. Their efforts often remain limited to superficial design changes, without delving into its core principles. The integration of healing design concepts into teaching practices frequently lacks systematic planning and coherence. Many educators struggle to effectively incorporate healing concepts into course content and teaching methodologies, significantly diminishing the potential benefits of healing design. Addressing this issue requires improving educators' awareness and understanding of healing principles and establishing a robust framework for effective implementation.

3.2. Challenges Brought by the Business Characteristics of Digital Teaching

3.2.1. Changing Learner Cognitive Needs and Complex Teaching Scenarios

Learners' cognitive needs frequently evolve, and teaching scenarios are often complex, presenting significant challenges in digital teaching. In modern education, learners vary greatly in personal backgrounds, existing knowledge levels, and preferred learning methods. Their requirements for learning content and methods exhibit considerable diversity and are subject to change over time. Educators often struggle to design a single teaching plan that accommodates the needs of all learners. Additionally, the complexity of digital teaching scenarios exacerbates this issue. Different learning tasks and objectives necessitate distinct teaching strategies and tools, making it difficult to integrate these diverse requirements efficiently on a single platform. Such complex scenarios can overwhelm learners, complicating information selection, increasing cognitive load, and negatively affecting learning outcomes.

3.2.2. Difficulty in Attributing Teaching Effects and Quantifying Input and Output

Difficulties in attributing teaching effects and quantifying input and output are significant challenges in the implementation of digital teaching. In digital education settings, the standards for evaluating teaching effects are often unclear, making it challenging for educators to accurately assess the impact of teaching methods on learners' cognition and emotions. Multiple factors contribute simultaneously, including learners' self-efficacy, external conditions, and the teaching methods employed by educators. Relying solely on single attribution analysis fails to capture the comprehensive picture of teaching effects, resulting in limited feedback for educational practice. Furthermore, the complexity of quantifying input and output complicates the ability of institutions to clearly measure the relationship between resource investment and learning outcomes. In digital teaching, inputs such as equipment setup, technical support, and teaching design require precise quantification. Learning outcomes extend beyond test scores to include

aspects such as mental health status, emotional engagement, and self-directed learning ability.

3.3. Ethical and Technical Dilemmas

3.3.1. Balance between Learner Privacy Protection and Data Use

In the process of integrating healing design into digital teaching, achieving a balance between protecting learner privacy and utilizing data is a significant ethical concern. The rise of personalized teaching enables the collection of extensive data on learner behavior, emotional states, and learning habits. This data helps educators better understand and address learners' needs. However, the use of such data must be grounded in respect for and protection of learner privacy. Learners often express concerns about the collection and use of their personal data, fearing potential privacy violations that could negatively impact their motivation and participation. Simultaneously, educational institutions must effectively leverage data to optimize teaching design and enhance instructional outcomes.

3.3.2. Risk of Technology Misuse and Homogeneous Experience

In the process of integrating healing design into digital teaching, the misuse of technology and the risk of homogenized experiences are critical issues that require close attention. The rapid advancement of technology can sometimes lead educators to over-rely on high-tech tools, neglecting the personalized needs and emotional experiences of learners. This overdependence may ultimately result in a decline in teaching effectiveness. When digital tools are used merely to replace traditional teaching methods, the learning process can become mechanized and dehumanized, disregarding the emotional and psychological needs of learners. Furthermore, the uniform application of technology often results in a lack of differentiation among learning platforms and course content, which diminishes personalization and innovation. This can lead to a flat and uninspiring learning experience, making it difficult to foster genuine emotional resonance and deep engagement among learners [8, 9].

4. Optimization Strategies for Healing Design Empowering Digital Teaching

4.1. Optimization Paths for Healing Design

4.1.1. Building a Unique Healing Design System and Managing Teaching Narrative Lines

Building a unique healing design system and managing teaching narrative lines is a key step in improving digital teaching outcomes. A unique healing design system should integrate learners' emotional needs and psychological traits. Through careful environment layout, color selection, and interaction design, it creates a warm and comfortable learning atmosphere. Teaching narrative line management organizes learning content in a clear and structured manner, forming a coherent and engaging learning story. This approach fosters emotional connections during learning, enhancing student participation and involvement [7, 10]. Teachers can employ strategies such as scenario simulation and role-playing to connect real-world cases with learning objectives. Learners gain knowledge through experiential learning and reflection, which improves cognitive outcomes. Throughout this process, data analysis tools can monitor learners' emotional states and provide real-time feedback. This allows for timely adjustments to narrative lines and teaching strategies, ensuring the achievement of learning goals and optimizing overall results.

4.1.2. Deepening Healing Meaning and Integrating Intelligent Technologies

Deepening the meaning of healing and integrating intelligent technologies is a crucial strategy to enhance the effectiveness of healing design in digital teaching [11]. By examining the core elements of healing design, its ability to address emotional needs and support mental health can be better understood, providing human-centered support for

digital education. Emotion computing technology can be utilized to analyze learners' emotional states in real time, allowing for timely adjustments to teaching content and difficulty levels. This approach helps to alleviate learning anxiety and reduce cognitive load. Artificial intelligence technology can further support personalized learning plans by offering customized learning resources and guidance based on learners' study habits and performance feedback. Additionally, virtual reality and augmented reality can contribute to healing design by creating immersive learning experiences. Scenario simulations can strengthen emotional connections and enhance cognitive understanding.

4.2. Strategies for Improving Digital Teaching

4.2.1. Achieving Full Scenario Learner Access and Emotional Interaction

Achieving full scenario learner access and emotional interaction is an important strategy to enhance the effectiveness of healing design in digital teaching [12, 13]. Full scenario learner access involves the use of multiple digital learning platforms and tools. Learners can receive learning support and emotional care before, during, and after class, breaking the constraints of time and space in traditional classrooms. Through mobile learning applications, online discussion areas, and social media, learners can access information and feedback anytime and anywhere, improving learning flexibility and convenience. In terms of emotional interaction, teachers can utilize regular online surveys, real-time interaction tools, and virtual guidance to understand learners' emotional states and psychological needs promptly. This allows them to respond actively and foster close teacher-student relationships. With emotion computing technology, learners' emotional responses can be analyzed, enabling automatic adjustments to interaction strategies. This approach enhances the depth and quality of emotional interaction.

4.2.2. Building a Dynamic Teaching Effect Evaluation Strategy Matrix

Building a dynamic teaching effect evaluation strategy matrix is a crucial approach to enhancing healing design in digital teaching. This matrix comprehensively reflects the multiple effects of teaching activities. Evaluation strategies should encompass cognitive, emotional, and behavioral indicators. They should be based on academic performance, emotional feedback, and participation levels to ensure thoroughness and accuracy. A combination of quantitative and qualitative methods should be employed. Data analysis tools can be utilized to collect real-time information on learning behavior, online interaction, and mental health status. Regularly generated evaluation reports provide a foundation for making teaching adjustments. Dynamic evaluation should adapt content and methods to different teaching stages, capturing changes and trends in the learning process. This ensures timeliness and adaptability. A feedback mechanism involving teachers, students, and parents should be established to incorporate multiple perspectives. This approach enhances the completeness and reliability of evaluation results.

4.3. Ethical and Technical Support Measures

4.3.1. Improving Learner Data Protection and Proper Use Mechanisms

Enhancing learner data protection and establishing proper use mechanisms are essential components of strengthening ethical support in digital education. A comprehensive data protection policy should be implemented to ensure the strict management of learners' personal information. This includes regulating data collection, storage, transfer, and deletion, with all operations adhering to relevant laws, regulations, and industry standards. Internal control measures should be established to limit data access rights, ensuring that only authorized educators and researchers can access sensitive information. This approach minimizes the risk of data breaches. Educational institutions should transparently communicate the purpose of data usage to learners, enabling them to fully understand how their data will be utilized. Learners should also retain the right to make choices regarding their data and withdraw authorization if desired, fostering trust. A well-designed data usage mechanism should prioritize real teaching needs, thereby enhancing personalized learning outcomes. During data analysis, results should

be anonymized and de-identified to safeguard learner privacy. Simultaneously, the data can be leveraged to optimize teaching strategies and improve the overall learning experience.

4.3.2. Establishing Review Standards for Healing Design Features and Teaching Diversity

Establishing the characteristics of healing design and the review norms for teaching diversity is a crucial measure to ensure the quality and effectiveness of digital teaching. Clear review standards should be formulated to systematically evaluate the core elements of healing design, such as emotional support, environmental optimization, and learner participation. This ensures that each design effectively enhances learners' psychological adaptation and emotional experience. Strengthening the review of teaching content and the diversity of methods is essential, encouraging educators to integrate varied teaching strategies into curriculum design, such as case analysis, situational simulation, and teamwork, to meet the needs of diverse learners [4]. The review norms should include regular evaluation and feedback mechanisms to promote continuous adjustment and innovation in teaching practices, ensuring that teaching activities remain flexible and targeted. Establishing an interdisciplinary review team that incorporates expert opinions from psychology, pedagogy, and design can further enhance the scientific rigor and authority of the review process.

5. Conclusion

This study examines the cognitive psychological adaptation system within digital teaching, enhanced by healing design principles. It investigates strategies to address learners' emotional needs and psychological adaptation by optimizing the teaching environment and enriching the learning experience. Healing design has been shown to enhance learners' motivation, improve mental health, and foster positive emotions. By implementing flexible teaching strategies, dynamic evaluation systems, and robust ethical safeguards, the integration of teaching with learners' emotional well-being can be achieved, creating a more human-centered learning environment. The study highlights the pivotal role of technology in enabling personalized learning and fostering emotional interaction. It advocates for the integration of advanced intelligent technologies with a solid psychological foundation to drive teaching innovation. Looking ahead to the future of digital education, it is essential to establish effective mechanisms for data protection and responsible usage, while embracing the principles of healing design and promoting diversity in teaching practices. These efforts provide critical support for achieving educational equity and enhancing quality. The developed cognitive psychological adaptation system offers novel perspectives for educational research, practical guidance for teaching practices, and contributes to the sustainable development and reform of digital education.

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