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Application Strategies of AI-Assisted Think Pair Share Teaching Model in Rehabilitation Therapy Education

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Abstract:

This study explores the application strategies of the AI-assisted Think Pair Share (TPS) teaching model in rehabilitation therapy education. The paper first analyzes the current application of the traditional TPS model in rehabilitation therapy education and proposes the design principles and framework for an AI-assisted TPS model. It then elaborates on specific AI application strategies in the three stages of TPS, including generating personalized learning materials, assisting with partner matching, and facilitating online collaborative discussions. The study also examines the application strategies of this model in theoretical, experimental, and clinical practice courses. The practical application effects of the AI-TPS model in specific rehabilitation therapy courses are validated through case analysis. The results indicate that the AI-assisted TPS model can effectively enhance the quality of teaching and learning outcomes in rehabilitation therapy education, providing new ideas and methods for innovation in this field.

Keywords: *Artificial Intelligence, Think Pair Share, Rehabilitation Therapy Education, Teaching Strategies, Intelligent Teaching Model*

Introduction:

Rehabilitation therapy education faces challenges such as integrating theory with practice and personalized teaching. The Think-Pair-Share (TPS) teaching model, an effective collaborative learning method, is widely used in medical education. However, the traditional TPS model still has limitations during implementation. With the rapid development of artificial intelligence (AI) technology, integrating AI with TPS offers new possibilities for rehabilitation therapy education. This study aims to explore the application strategies of the AI-assisted TPS model in rehabilitation therapy education to improve teaching effectiveness and cultivate students' critical thinking and clinical practice abilities. This innovative model is expected to provide new ideas and methods for reforming and developing rehabilitation therapy education.

Current Application of Traditional TPS Model in Rehabilitation Therapy Education:

As an effective collaborative learning strategy, the traditional TPS (Think-Pair-Share) model has been widely applied in rehabilitation therapy education in recent years. Through the three stages of "thinking-pairing-sharing," this teaching model effectively promotes active learning and deep thinking among students. In theoretical courses of rehabilitation therapy, teachers often use the TPS model to guide students in understanding complex pathological mechanisms or treatment principles. For instance, in neurorehabilitation courses, a teacher might ask about abnormal gait in stroke patients, prompting students to think independently first, then discuss with peers, and finally share insights with the entire class. This method deepens students' understanding of knowledge and cultivates their critical thinking abilities. The TPS model is also used in experimental courses to facilitate discussions on experimental design and result analysis.

However, the traditional TPS model faces some challenges during implementation. For example, in large classes, it is difficult for teachers to ensure every student actively participates; during the pairing stage, significant differences in knowledge levels among students may affect the quality of discussions, and in the sharing stage, time constraints may prevent some students from expressing their ideas. Despite these challenges, the TPS model still shows unique advantages in rehabilitation therapy education, especially in cultivating students' clinical thinking and practical abilities. The TPS model is widely used for case discussions and treatment plan development in clinical internship courses. Students first think independently about the patient's condition, then discuss possible treatment strategies with peers, and finally share and discuss various plans under the teacher's guidance. This method helps students apply theoretical knowledge to actual cases and cultivates their teamwork and communication skills, essential professional qualities for rehabilitation therapists.

However, the traditional TPS model must still be improved to accommodate students with different learning styles and abilities. Some introverted students may feel uncomfortable during the pairing and sharing stages, while for some weaker students, the independent thinking stage might be challenging. Furthermore, in the context of increasing emphasis on personalized education, the limitations of the traditional TPS model in providing targeted guidance and feedback are becoming more apparent. These issues suggest exploring how to optimize and improve the TPS model to meet rehabilitation therapy education's characteristics and needs.

Theoretical Framework of AI-Assisted TPS Model in Rehabilitation Therapy Education:

In modern medical education, the application of artificial intelligence (AI) technology is becoming increasingly widespread, especially in teaching rehabilitation therapy, where AI technology has shown great potential. We adopted the AI-TPS model better to integrate AI into the teaching process of rehabilitation therapy. This model uses a structured teaching method to apply AI

technology to different courses, including theoretical, experimental, and clinical practice courses. (Tables 1, 2, and 3) summarize the application strategies of the AI-TPS model in theoretical, experimental, and clinical practice courses of rehabilitation therapy. Each course type is divided into three stages: thinking, pairing, and sharing, and the specific application methods of AI at each stage are listed in detail. This structured presentation helps educators and learners understand and implement AI-assisted teaching strategies more clearly.

Theoretical Course Application Strategies	Laboratory Course Application Strategies	Clinical Practice Course Application Strategies
AI generates tailored clinical cases based on students' knowledge levels and learning progress.	AI generates diverse patient models, including virtual patients of different ages, genders, body types, and pathological conditions.	AI maintains a dynamic virtual stroke patient case library, including diverse medical histories, imaging materials, assessment results, etc.
Provides intelligent hints such as anatomy knowledge and critical mechanisms to help students build thinking frameworks.	Provides real-time operational guidance such as correct instrument placement and patient posture adjustment.	It offers intelligent literature search functions to help students quickly find relevant evidence-based medical evidence.

Tab.1 AI-Assisted Thinking Stage Strategies Across Different Course Types in Rehabilitation Education

Case Analysis: Application of AI TPS Model in Rehabilitation Therapy Courses:

1.1 Case Background Introduction:

This case study is in the rehabilitation therapy program's "Neurorehabilitation" course. This course is one of the core courses of the rehabilitation therapy program, primarily targeting third-year students. A critical teaching unit in this course is "Rehabilitation Treatment for Stroke Patients," which typically requires 4-6 class hours to complete.

This unit relies mainly on teacher lectures and passive student reception in the traditional teaching model. Students generally need help to integrate theoretical knowledge with clinical practice. To address this issue, the course team introduced the AI-TPS teaching model to improve students' learning engagement, critical thinking skills, and clinical decision-making abilities.

1.2 Application Strategy Details:

1.2.1 Preparation:

The AI system generates personalized pre-study materials based on students' previous learning data, including relevant anatomical and physiological knowledge reviews and the latest advances in stroke rehabilitation research. Students complete pre-study tests via the AI system, which generates personalized learning objectives based on the test results for each student.

Theoretical Course Application Strategies	**Laboratory Course Application Strategies**	**Clinical Practice Course Application Strategies**
Matches learning partners with complementary perspectives to promote in-depth discussion.	Facilitates skill exchange among students, possibly using split screen technology to display the operation process of two students for direct comparison and learning.	AI simulates patients or their families to interact with students, cultivating communication skills and empathy.
AI is a virtual assistant in discussions, providing relevant research literature or clinical guidelines to enrich the content.	AI analyzes students' operation videos, identifies typical mistakes, and encourages discussion on how to improve.	Compares plans, generates a comparison matrix highlighting different plans' strengths and potential risks, and simulates other medical professionals to promote interdisciplinary cooperation.
Organizes targeted debates, such as the pros and cons of different rehabilitation intervention timings.	Select representative measurement cases (including typical and atypical cases) for students to discuss, deepening the understanding of joint mobility characteristics under different pathological conditions.	Assists students in preparing case presentations and providing professional slide templates and speech skills advice.
Provides the latest research overviews and clinical guidelines after the debate.	Summarizes the measurement results of the whole class, generating visual comparison charts and highlighting measurement errors and	Based on the rehabilitation plans proposed by students, it simulates the treatment process and possible outcomes, helping students understand the

	accuracy.	long-term impact of different decisions.

Tab.2 AI-Assisted Pair Stage Strategies Across Different Course Types in Rehabilitation Education

Theoretical Course Application Strategies	**Laboratory Course Application Strategies**	**Clinical Practice Course Application Strategies**
AI summarizes the critical points of each group's discussion and generates visual charts.	Summarizes the measurement results of the whole class, generating visual comparison charts.	Based on the rehabilitation plans proposed by students, simulate the treatment process and possible outcomes.
Organizes debates based on the differences in each group's viewpoints.	Selects students with excellent measurement skills and showcases best practices in 3D animation.	Generates personalized improvement suggestions and additional practice plans based on each student's performance.
AI provides a comprehensive learning assessment report.	Generates personalized improvement suggestions and additional practice plans based on each student's performance.	Provides personalized further learning suggestions.

Tab.3. AI-Assisted Share Stage Strategies Across Different Course Types in Rehabilitation Education

1.2.2 Classroom Teaching (Based on AI-TPS Model)

- Think Stage:

  The AI system presents a complex stroke case, including detailed patient history, imaging data, and assessment results. Students independently think about and record their assessment of the patient's rehabilitation potential and initial treatment plan on tablets. The AI system analyzes students' answers in real-time, providing personalized prompts and guidance, such as pointing out potentially overlooked vital information.

- Pair Stage:

  The AI system intelligently matches students with complementary thinking based on their answers. Students discuss their assessments and plans in pairs, with the AI system acting as a virtual assistant, providing relevant research literature and clinical guidelines. The AI system monitors the quality of discussions, posing challenging questions to promote deeper thinking.

- Share Stage:

  The AI system selects representative student pairs to share with the whole class and generates a visual comparison of all plans. Under the teacher's guidance, the class discusses the strengths and weaknesses of different rehabilitation plans. The AI system summarizes the discussion points in real time, creating a mind map. It simulates the long-term effects of different rehabilitation plans, helping students understand the complexity of clinical decision-making.

1.2.3 Review and Application After Class:

The AI system generates personalized review materials and exercises based on each student's performance in class.

The AI system guides students to apply the knowledge they have learned to new virtual cases, developing clinical thinking skills.

Conclusion:

The study indicates that the success factors of AI-TPS teaching mainly include personalized learning, instant feedback, deep collaboration, and contextual simulation. The AI system significantly enhances learning efficiency by providing customized learning experiences for each student; the instant feedback mechanism helps students quickly identify and correct misconceptions; AI-assisted pair discussions promote deep exchanges and collision of ideas among students; and contextual learning methods such as virtual cases and treatment simulations effectively integrate theoretical knowledge with clinical practice, comprehensively improving the quality and effectiveness of medical education. These factors work together to fully leverage AI's advantages in medical education, pointing the way for future innovations in educational models.

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