Effect of Inquiry-Based Teaching Methods on Practical Abilities in Rehabilitation Therapy Technology among Vocational College Students in Yunnan

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Runli Tian
Rajamagala University of Technology Krungthep, Thailand

Saifon Songsiengchai
Rajamagala University of Technology Krungthep, Thailand
https://orcid.org/0009-0003-7379-4980

Xian Hao
Rajamangala University of Technology Krungthep, Thailand

Abstract

This research aims to explore the impact of inquiry-based teaching methods on the practical abilities of students majoring in rehabilitation therapy technology, and the research population covers the 2023 first-year students majoring in rehabilitation therapy technology at Yunnan College of Economics and Trade and Foreign Affairs Vocational College. Simple random sampling was used in this research. This research aims to achieve three objectives: (1) To investigate the differences between inquiry-based and traditional teaching methods in enhancing students' practical abilities. (2) To research how inquiry-based teaching methods enhance students' practical abilities. (3) To explore the students' satisfaction with inquiry-based and traditional teaching methods in enhancing students' practical abilities. Research tools included lesson plans,questionnaires, tests, and perspective surveys, with data analyzed using mean value (M), standard deviation (S.D.), and t-value. The findings were as follows: (1) For the experimental group M=4.31, S.D.=0.83, showing that the inquiry-based teaching method can significantly improve students' practical skills, (2) For the experimental group M=83.20, S.D.=9.89,by creating situations, open classrooms, cooperative inquiry, and practical application. The final grade of the experimental group was significantly better than that of the control group. (3) For the experimental group M=4.30, S.D.=0.87, Shows higher student satisfaction with inquiry-based teaching methods. The inquiry-based teaching method can significantly improve the practical skills and comprehensive quality of rehabilitation therapy technology students, stimulate their interest in learning, and is conducive to improving the teaching effect.

Keywords: Inquiry-based teaching methods, Rehabilitation therapy technology, Practical abilities

Introduction

With the increasing demand for rehabilitation therapy in society, cultivating rehabilitation therapy technology professionals is particularly important. The core of the teaching of rehabilitation therapy technology is "competence-based," which requires clinical practical teaching centered on improving students' operational skills. As a student-centered teaching method, inquiry-based teaching methods emphasize acquiring knowledge through students' active exploration and discovery, seeking ways to solve problems by guiding students to carry out inquiry activities around the issue, and paying more attention to the process and learning method than the results. In this mode of teaching, the role of the teacher is more of a guide and facilitator than a mere transmitter of knowledge. Teachers, in the teaching process, play the positive role of inquiry-based teaching, stimulate students to actively participate in classroom

inquiry, actively play the student's subjective consciousness, guide students in the inquiry activities to actively complete the whole process of teaching and learning, full and effective communication, to create a highly effective teaching practical classroom, so that students can get a good learning experience, improve the sense of access to student learning courses. At the same time, inquiry-based teaching methods help to cultivate students' independent learning ability, cooperation, and communication ability through creating situations, open classrooms, cooperative inquiry, practical application, etc., so that students can find and solve problems in the way of inquiry learning in teaching activities and improve students' problem-solving ability as well as vocational practical ability. The purpose of this research is to investigate how inquiry-based teaching methods affect the practical ability of rehabilitation therapy technology students, i.e., the ability of students to apply their knowledge, skills, and attitudes in real-life rehabilitation therapy situations.

Literature Review

A study revealed that inquiry based science education (IBSE) succeeded in improving inquiry skills in secondary school students. The importance of proper inquiry activities design, the use of digital technologies, and formative assessment instruments were stated in the research, showing that there was a statistically significant increase in inquiry skills among students (Ješkova et al., 2022). Under inquiry-based learning, students have demonstrated high levels of science literacy and research as opposed to the traditional curriculums. This method also enhances confidence of students when it comes to scientific skills and gets them acquainted with the intricacies of scientific study (Gormally et al., 2009).

Learning gains among students are seen to benefit when inquiry-based teaching is adopted in laboratory courses. The results of most studies in this field suggest that students would gain a better experience out of guided inquiry activities, which leads to the necessity of establishing repetitious assessment to generalize the outcomes in different education contexts (Beck et al., 2014).

The improvement of inquiry-based strategies application of the teachers via constructivist sociocultural model shows positive results as teachers learn to direct the focus to the inquiry type of environment and experience dramatic changes in their pedagogy and teaching behaviours (Brand & Moore, 2010). Results of a meta-analysis showed that inquiry-based instruction is a useful practice in terms of fostering the development and advancement of the higher-order thinking of students in many schooling levels and science fields. The beneficial effect is quite impressive, regardless of the kind of inquiry method embraced (Antonio & Prudente, 2023).

Although an inquiry-based STEM learning strategy has been proven to be effective in supporting the development of the skills needed in the 21 st century among the gifted students, its application can be extended to other levels of education (Abdurrahman et al., 2019). A review highlighted the significance of self-efficacy in the implementation of inquiry-based teaching in an efficient way. Intervention in the form of professional learning that helps teachers gain confidence in this mode of instruction is essential to the successful implementation thereof (Seneviratne et al., 2019).

An educational activity using the 5E constructivist model has successfully prepared individuals to acquire skills in communicating effectively at the workplace and in maintaining a collaborative attitude necessary to improve vocational training (Chen, 2021). Critical thinking and inquiry skills aspect of teaching inquiry skills has great impact on the critical thinking skills of students. The effect shows the relevance of application of socio-psychological factor in science education to enrich science teaching practice and learners outcomes (Abu Khurma & El Zein, 2024).

Although research suggests that numerous predictor factors influence the adoption of inquiry-based teaching by Chinese university students, the results demonstrate that factors such as self-efficacy, perceived usefulness are paramount towards understanding students acceptance and their positive approach to this method (Hu et al., 2024).

Methodology

This research used a mixed-methods study, combining qualitative and quantitative methods, to systematically assess the impact of inquiry-based teaching methods on the practice competence of

rehabilitation therapy technology students through a control group/experimental group structure. The research tools included teaching plans, questionnaires, tests, and satisfaction surveys, and data were analyzed by means and standard deviations.

The research tools included lesson plans, questionnaires, tests, and satisfaction surveys. The teaching plan was designed for the experimental group, and it included four steps: creating situations, opening classrooms, cooperative inquiry, and practical application. The questionnaire used a Likert scale to assess students' self-directed learning, practical operation, cooperation, communication, and problem-solving abilities. Tests assessed students' knowledge and understanding of the five key areas through multiple-choice questions. The satisfaction survey assessed students' satisfaction with inquiry-based teaching methods through a Likert scale. Research Questions include

- Is there a statistically significant difference between inquiry-based and traditional teaching methods in enhancing students' practical abilities?
- How do inquiry-based teaching methods enhance students' practical abilities in rehabilitation therapy technology?
- What are students' perceptions towards inquiry-based teaching methods in improving their practical abilities?

Samples

The research population covers the 2023 academic year, first-year students majoring in rehabilitation therapy technology at Yunnan College of Economics and Trade and Foreign Affairs Vocational College. According to the data provided by the official website of Yunnan College of Economics and Trade and Foreign Affairs Vocational College, there will be about 100 new students in the 2023 academic year. This study used the Purposive sampling method because there are two classrooms, classroom 1 and classroom 2. Fifty students from Classroom 1 were divided into the control group, and 50 from Classroom 2 were divided into the experimental group. The age range of the first-year students in the 2023 academic year class in Yunnan College of Economics and Trade and Foreign Affairs is roughly 18-19 years old. The current study utilized a relatively small sample size, which may restrict the generalizability of findings to broader student populations. In addition, Yunnan Vocational College of Economics and Trade and Foreign Affairs was founded in 1992, approved by the provincial people's government in 2004, and recorded by the Ministry of Education of the People's Republic of China as a full-time general vocational school of higher education, and in 2011, the school was identified as a Yunnan provincial demonstrative vocational college of higher education.

Data Collection

Table 1

Research Questions	Research Objectives	Research Instruments	Data Collection	Data Analysis
Is there a statistically significant difference between inquiry-based and traditional teaching methods in enhancing students' practical abilities?	To investigate the differences between inquiry-based and traditional teaching methods in enhancing students' practical abilities.	Lesson Plans, Questionnaire	Questionnaire administration and Lesson plans implementation	Mean, Standard Deviation, T-test
How do inquiry-based teaching methods enhance students' practical abilities in rehabilitation therapy technology?	To research how inquiry-based teaching methods enhance students' practical abilities.	Paper Test, Lesson Plans	Pre and post-tests with students, Implementation of lesson plans	Mean, Standard Deviation, T-test, Content Analysis

What are students' perceptions towards inquiry-based teaching methods in improving their practical abilities?	To explore the student's satisfaction with inquiry-based and traditional teaching methods in enhancing students' practical abilities.	Questionnaire	Questionnaire distribution and collection	Mean, Standard Deviation, Content Analysis

Analysis and Discussion

Comparison of means: the overall mean of the experimental group is 4.31, while the overall mean of the control group is 3.33. This indicates that students in the experimental group were significantly more supportive of the teaching methods than students in the control group. Standard Deviation Comparison: The overall standard deviation in the experimental group is 0.83, and the overall standard deviation in the control group is 1.23, indicating that student support was more centralized in the experimental group and more diffuse in control group presented in Table 2.

Table 2

	Inquiry-based teaching methods	Traditional teaching methods	Different
M	4.31	3.33	0.98
S.D.	0.83	0.33	0.50

Standard deviation is a measure of the degree of dispersion of data. The standard deviation of the control group is slightly higher than that of the experimental group, which means that the distribution of the grades of the control group is relatively more dispersed. In contrast, the distribution of the grades of the experimental group is relatively more concentrated.

Table 3 Comparison between the Control and Experimental Group

The Control group		The experimental group
M	65.06%	83.20%
S.D.	10.47	9.89

Table 3 explains that the mean score of the experimental group is higher than that of the control group by 18.14 %, which indicates that overall, the students of the experimental group using the inquiry-based teaching methods performed significantly better than the students of the control group using the traditional teaching methods in this course.

Experimental group: students' satisfaction with inquiry-based teaching methods is high, indicating that these teaching methods are effective in improving students' independent learning ability, practical ability, cooperation and communication ability, and problem-solving ability.

Control group: students' satisfaction with traditional teaching methods is low, indicating that conventional teaching methods may need to be optimized in practical application to improve students' participation and satisfaction.

It shows that students' satisfaction with inquiry-based teaching sessions is high, with a mean value close to 4.30, indicating that students are generally satisfied with inquiry-based teaching methods. The standard deviation is small, suggesting that students' satisfaction is more consistent and does not vary much.

Table 4 Comparison between Inquiry-based Teaching Methods and Traditional Teaching Methods

	Inquiry-based teaching methods	Traditional teaching methods	Different
M	4.30	2.84	1.46
S.D.	0.87	1.26	0.39

Table 4 revealed that Inquiry-based teaching methods were at M=4.30 and the Traditional teaching methods were at M=2.84. The difference was at M=1.46 level.

Discussion

By comparing the results of the experimental and control groups,inquiry-based teaching methods can significantly improve the practical abilities of rehabilitation therapy technology students. Therefore, educators should actively learn from and apply new teaching methods (inquiry-based teaching methods) and continuously enhance traditional

teaching methods to improve the teaching effect and students' learning experience.

Students in the experimental group showed higher teaching effectiveness and better distribution of grades under the inquiry-based teaching methods, but there were still some students with negative differences. This indicates that although the inquiry-based teaching method is effective, there is still room for improvement.

Students in the control group were less satisfied with traditional teaching methods, indicating that conventional teaching methods are deficient in enhancing student engagement and satisfaction. Inquiry-based teaching methods in teaching practical abilities of rehabilitation therapy technology not only improve students' professional ability and theoretical knowledge but also enhance students' satisfaction and participation in the learning process.

In summary, the study's results support previous studies emphasizing the effectiveness of inquiry-based teaching methods in teaching and learning.

Conclusion

The results of this research show that inquiry-based teaching methods have significant effects in improving the practical abilities of rehabilitation therapy technology students. Compared with the traditional teaching method, inquiry-based teaching methods can significantly enhance students' self-directed learning, practical operation, cooperation, communication, and problem-solving ability. In addition, inquiry-based teaching methods can stimulate students' interest in education and increase their satisfaction with the teaching method. However, the research also found that some students may have difficulties adapting to the inquiry-based teaching method, which requires further optimization of teaching methods and contents. The results of this research show that inquiry-based teaching methods have significant effects in improving the practical abilities of rehabilitation therapy technology students. Compared with the traditional teaching method, inquiry-based teaching methods can significantly enhance students' creating situations, open classrooms, cooperative inquiry, and practical application. In addition, inquiry-based teaching methods can stimulate students' interest in learning and improve students' practical ability through creating situations, open classrooms, cooperative inquiry, and practical application. Positive teaching results and high student satisfaction have been achieved in teaching the practical ability of rehabilitation therapy technology. Improving students' satisfaction with teaching methods. However, the research also found that some students may have difficulties adapting to inquiry-based teaching methods, which requires further optimization of teaching methods and contents.

This study admits several limitations even though it shows that inquiry-based teaching techniques significantly enhance students' practical skills. First, only 100 students from two vocational institutions made up the study's sample size, limiting how broadly the results could be applied. Second, the accuracy of data may be impacted by subjective biases in student replies when self-reported instruments like questionnaires and satisfaction surveys are used. Variations in results could also have been caused by outside variables like the effectiveness of the teachers, the classroom environment, or the motivation and past knowledge of the pupils. To further validate and improve these findings, it is advised that future research use stratified or systematic sampling strategies, include bigger sample sizes from several institutions and use qualitative methods.

Recommendations

Teacher Preparedness Challenge: Provide more details on how teachers might prepare to shift from conventional to inquiry-based instruction. Provide particular resources and advice for professional development.

Challenges in Assessment: Provide instructions on how to evaluate student's progress in an inquiry-based setting, emphasizing skills evaluation over topic knowledge alone.

Classroom Management: Offer techniques to deal with the more dynamic and occasionally chaotic nature of inquiry-based classrooms, such as setting up student conferences and establishing explicit success.

Student Adaptation: Talk about how educators can support learners who find inquiry-based learning difficult, especially those used to more conventional teaching approaches.

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Conflict of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Author Details

Runli Tian, *Rajamagala University of Technology Krungthep, Thailand.*

Saifon Songsiengchai, *Rajamagala University of Technology Krungthep, Thailand,*
***Email ID**: saifon.s@mail.rmutk.ac.th*

Xian Hao, *Rajamangala University of Technology Krungthep, Thailand*