Research on the Mode Reform of Online and Offline Interactive Feedback in Internal Medicine Nursing Teaching Based on SPOC and Flipped Classroom

Gao Hong, Xu Jie, Sun Qi

Hainan Vocational University of Science and Technology, Haikou, Hainan, China

Abstract: *This study explores the construction and application of an online and offline interactive feedback teaching model based on SPOC (Small Private Online Course) and flipped classroom in the context of internal medicine nursing teaching. Through the analysis of existing teaching modes and the role of interactive feedback mechanisms in education, a teaching model combining SPOC resources and flipped classroom interaction was designed. The study focuses on the principles and framework of the model design, emphasizing specific teaching implementation and the construction of the interactive feedback mechanism to ensure dynamic regulation and personalized guidance throughout the teaching process. The experimental results show that this model has significant advantages in improving students' mastery of theoretical knowledge, application of practical skills, and learning enthusiasm. It also reveals issues such as insufficient self-learning abilities in some students and teacher role adaptation challenges. The study provides theoretical support and practical references for innovation in internal medicine nursing teaching, further promoting the reform and development of nursing education.*

Keywords: *SPOC; Flipped Classroom; Interactive; Internal Medicine; Teaching Model*

1. Introduction

In recent years, with the rapid development of information technology and the increasing demands for educational modernization, higher education has entered a phase of deep teaching mode reform. Internal medicine nursing, as a crucial component of nursing education, directly impacts the clinical practice abilities of future nurses. However, traditional teaching modes, which are primarily centered on teacher lectures and focus on theoretical knowledge transmission, neglect the students' central role and the cultivation of practical skills. This teaching method often leads to low student engagement, insufficient participation, and weak practical application abilities, making it difficult to meet the talent cultivation needs of nursing disciplines in the new era. Meanwhile, the disconnection between theory and practice in internal medicine nursing education needs urgent attention. In the context of increasingly refined nursing skills, integrating practical scenarios into theoretical learning and strengthening learning outcomes through feedback mechanisms have become key issues in current teaching reform.

This research aims to explore the application of a teaching model based on SPOC and flipped classroom in internal medicine nursing, focusing on interactive feedback as a core component, and design an online-offline integrated teaching reform scheme. Through systematic research, this study not only assesses the impact of this model on improving students' learning outcomes and engagement but also analyzes the potential of interactive feedback in optimizing teaching quality. Ultimately, the research hopes to provide scientific evidence and practical guidance for the reform of nursing education, promoting the transition of teaching modes from "teacher-centered" to "student-centered," and meeting the development needs of internal medicine nursing education in terms of modernization, personalization, and practicality.

2. Current State of Research on Internal Medicine Nursing Teaching Models

Internal medicine nursing, as an essential course in nursing education, has long been a focal point in educational research. However, from the current teaching practices, traditional models still dominate, focusing on teacher-centered lectures and emphasizing the systematic and complete nature of

theoretical knowledge while neglecting students' participation and the cultivation of active learning skills. Although this model ensures standardized knowledge delivery, it significantly falls short in terms of student engagement, classroom participation, and the enhancement of practical abilities. This issue is especially pronounced in disciplines like internal medicine nursing, which involve complex knowledge systems and require students to apply theoretical knowledge flexibly in clinical settings. However, traditional teaching often separates theory from practice, making it difficult for students to quickly adapt to real-world clinical environments, leading to a "disconnect" between theory and practice, which is one of the main obstacles to improving teaching effectiveness.

In recent years, to address the shortcomings of traditional teaching, scholars both domestically and internationally have gradually explored diverse teaching methods, such as case-based teaching, scenario simulation teaching, and problem-based learning (PBL). These methods have partially addressed the shortcomings of traditional models by emphasizing student participation, the development of practical abilities, and clinical decision-making skills. However, these reforms still face various issues during implementation, such as insufficient teaching resources, difficulty in addressing individual student differences, and an incomplete evaluation system. Furthermore, while these teaching modes enhance classroom interaction, they have not fully leveraged modern information technology to address personalized learning needs and feedback delays[1].

3. The Role of Interactive Feedback in Education

The role of interactive feedback in education cannot be ignored. It is not only a two-way communication mechanism between teachers and students but also an essential tool for optimizing teaching effectiveness and promoting students' personalized growth. In the educational process, the core value of feedback lies in providing timely and specific information to help students understand learning objectives, identify gaps in knowledge or skills, and adjust learning strategies for self-improvement. Through interactive feedback, students can gain a clearer understanding of their learning status, transforming from passive knowledge recipients to active seekers of learning paths, thus enhancing learning enthusiasm and autonomy.

Furthermore, interactive feedback provides teachers with a window to monitor students' learning dynamics, allowing teachers to adjust teaching strategies based on student feedback, such as optimizing the difficulty of teaching content, adjusting classroom pace, or improving teaching methods, thereby achieving dynamic optimization of the teaching design.

In teaching activities, interactive feedback is not limited to teacher evaluation of students; it also includes peer-to-peer interactions and reverse feedback from students to teachers. Peer feedback can stimulate learning inspiration through collaboration and discussion, deepen understanding of knowledge, and foster teamwork and communication skills. Reverse feedback helps teachers evaluate teaching effectiveness from the students' perspective, identify problems in teaching, and improve the relevance and effectiveness of instruction. With the support of information technology, the forms of interactive feedback have become more diverse. For example, online learning platforms provide progress tracking and instant assessments, which not only ensure the real-time nature of feedback but also present personalized learning suggestions through data analysis. This technology-assisted feedback mechanism can address the feedback delays caused by time or human limitations in traditional classrooms, greatly enhancing educational outcomes[2].

Moreover, interactive feedback plays an essential role in developing students' metacognitive abilities and critical thinking. By reflecting on feedback, students can gradually acquire self-monitoring and self-assessment skills, which will help them more effectively plan and manage their learning activities in the future. At the same time, interactive feedback can foster trust between students and teachers, creating a positive and cooperative learning atmosphere, laying the foundation for deeper knowledge exploration and skill enhancement. Overall, interactive feedback is not only a vital tool for achieving effective education but also a key driver for innovative teaching modes and holistic student development.

4. Design of the Teaching Mode Based on SPOC and Flipped Classroom

4.1 Principles and Framework of Mode Design

The design of the teaching model based on SPOC and flipped classroom must adhere to the

principles of scientific rigor, flexibility, and student-centeredness, and build a systematic teaching framework to achieve the in-depth integration of theory and practice. The model design should balance knowledge transmission and skill development, starting with students' learning needs, and create a dynamic, interactive, and feedback-driven learning environment through the organic combination of online and offline resources. In this process, the model design should focus not only on the precise organization of course content but also on the reasonable arrangement of learning activities to ensure the progressive development of knowledge and the deepening of skills. The design should be student-centered, providing students with more autonomy in learning, guiding them to internalize and transfer knowledge through self-exploration and peer collaboration.

The framework design should integrate the advantages of SPOC and flipped classrooms, combining online resources with offline teaching interaction to form a closed-loop teaching process. Before class, the SPOC platform provides high-quality course resources, such as micro-lecture videos, animated case studies, and quizzes, to help students preview the knowledge and receive real-time feedback on their learning progress through online assessments. This stage emphasizes modularity and personalization of resources to ensure that students can select suitable content based on their learning pace. During class, flipped classroom activities focus on converting learning outcomes into skills. The teacher's role shifts to that of a facilitator, observing student performance in real-time and providing precise guidance through interactive feedback to enhance classroom participation and relevance.

4.2 Specific Teaching Design

In the specific teaching design, the teaching model based on SPOC and flipped classrooms combines theoretical knowledge acquisition with practical skills development. Through the optimization of online resources and the fine-tuning of offline activities, a complete teaching loop is formed. In the pre-class stage, the teaching design is based on the SPOC platform, providing carefully designed learning resources, including micro-lecture videos, interactive courseware, and self-assessment tools. These resources are closely aligned with the teaching objectives, helping students master theoretical foundations through self-directed learning. The pre-class design emphasizes real-time monitoring of learning data, where students provide feedback on their progress and learning outcomes. This data serves as a reference for teachers to understand students' weak points and design targeted teaching strategies.

During class, the core of flipped classroom activities is the design of tasks aimed at stimulating student participation and collaboration. Specific teaching design is problem-driven, using methods such as case analysis, group discussions, and scenario simulations to apply pre-class theoretical knowledge to practical problem-solving scenarios. In this process, teachers act as facilitators, guiding students to think critically, pose key questions, and provide real-time feedback to refine their ideas. For instance, role-playing clinical situations in internal medicine nursing requires students to make judgments and perform tasks based on pre-class knowledge, adjusting and refining their actions through practice. Teachers observe students' performance in class, using interactive feedback to correct mistakes or deepen their thinking, thereby achieving an organic unity of theory and practice.

The post-class teaching design focuses on deepening knowledge and facilitating knowledge transfer. Through the SPOC platform, extended learning resources and practical tasks, such as self-analysis of complex cases, online experiment simulations, or personalized readings, are provided for students to reinforce and expand their learning. Post-class design emphasizes reflective learning, where students review their learning processes, summarize experiences, and identify areas for improvement. Teachers use this data and student feedback to further optimize teaching content and strategies, creating a virtuous teaching cycle. Overall, the specific teaching design is student-centered, making full use of information technology and online-offline resource advantages, building an efficient, interactive, and flexible learning ecosystem that enhances teaching outcomes and provides solid support for students' skill development and overall quality improvement[3].

4.3 Construction of Interactive Feedback Mechanism

The interactive feedback mechanism is the core link of this model. It helps maintain real-time and dynamic interaction between students and teachers, enhancing teaching efficacy and student engagement. The interactive feedback mechanism involves multiple dimensions, including student-to-student, student-to-teacher, and teacher-to-student feedback. The feedback forms include real-time assessments, peer evaluations, online question-answer sessions, in-class performance reviews,

and post-class reflective feedback. Through these feedback channels, the teaching process is continually adjusted to better meet the individual learning needs of students, promote cooperative learning, and strengthen practical application skills.

Interactive Feedback Design and Implementation of SPOC-Based Flipped Classroom in Internal Medicine Nursing Education

In-Class Phase: The design of interactive feedback during the in-class phase focuses on enhancing students' classroom participation and problem-solving abilities. Classroom activities are task-driven, and the teacher uses questioning, real-time evaluation, and observational feedback during group discussions to guide students in deep thinking. For instance, during case discussions, the teacher can immediately point out logical flaws or misunderstandings based on students' responses, and help students refine their ideas through thought-provoking questions. Peer feedback among students is also an important component of the interactive mechanism. By collaborating on tasks, students share insights and receive multidimensional evaluations through discussions and exchanges, thereby deepening their understanding of the knowledge. This feedback process not only enhances classroom interactivity but also subtly cultivates students' critical thinking and teamwork skills.

Post-Class Phase: The interactive feedback mechanism in the post-class phase is designed to help students summarize their learning achievements and facilitate knowledge transfer. The platform provides detailed learning reports, allowing students to review their learning process, identify strengths and weaknesses. Meanwhile, teachers use learning data collected on the platform to provide personalized feedback, such as recommending supplementary resources or practice tasks suitable for the students' learning levels. Additionally, post-class discussion areas and Q&A functions offer continuous interaction channels for students and teachers, as well as between students themselves, extending the intellectual exchanges and knowledge exploration from the classroom. This creates a learning feedback loop. In conclusion, this multi-layered, all-encompassing interactive feedback mechanism not only strengthens the achievement of teaching objectives but also stimulates students' intrinsic motivation through deep intervention in the learning process, promoting the overall development of their autonomous learning abilities and comprehensive competencies.

5. Model Implementation and Experimental Research

The implementation and experimental research of the teaching model are critical steps in verifying the effectiveness of the SPOC-based flipped classroom teaching model. The core of this process is to evaluate the improvement in learning outcomes and the achievement of teaching goals through a scientifically-designed practice process and rigorous data analysis. During model implementation, representative teaching scenarios and sample groups are selected, typically piloting a course in internal medicine nursing. Specific teaching activities are designed for different teaching phases (pre-class, in-class, post-class), and online and offline resources along with interactive feedback mechanisms are deployed comprehensively. In the pre-class phase, the SPOC platform provides opportunities for students to engage in self-directed learning, and learning behavior data are recorded through assessment tools to ensure students have mastered fundamental knowledge at a certain level. During class, interactive elements of the flipped classroom design are used to observe students' performance in task-solving and adjust teaching pace in real-time to accommodate individual differences. After class, consolidation and extension activities are arranged, and learning outcomes are tracked through the platform, collecting feedback to improve the overall teaching loop.

Experimental research is a key step in verifying the implementation's effectiveness. The study usually adopts a controlled experimental design, with the traditional teaching model as the control group and the SPOC-based flipped classroom model as the experimental group. The goal is to evaluate the differences between the two models in terms of students' knowledge mastery, practical ability, and learning satisfaction. To ensure scientific rigor and data objectivity, participants are balanced across gender, learning background, and interests before the experiment. Afterward, multidimensional evaluation tools, including academic performance, skill assessments, classroom participation, and learning confidence surveys, are used to collect both quantitative and qualitative data. Simultaneously, data mining techniques are used to analyze learning behavior records on the SPOC platform, exploring correlations between students' behaviors during learning and their learning outcomes.

In the experimental research, attention is given not only to the overall significance of the results but also to the key factors affecting teaching outcomes, such as students' learning habits, teachers' classroom guidance strategies, and the quality of resource design. Through these analyses, the teaching model can be further optimized to better meet diverse learning needs. Ultimately, model

implementation and experimental research not only provide scientific evidence for the superiority of the teaching model but also accumulate valuable experience for future teaching practice and theoretical innovation, driving the continuous improvement of educational models and the comprehensive enhancement of nursing education quality[4].

6. Experimental Results and Analysis

The analysis of experimental results is a crucial phase in evaluating the effectiveness of the SPOC-based flipped classroom model in internal medicine nursing teaching. It aims to interpret data and phenomena comprehensively and reveal the actual impact of the new model on achieving teaching objectives. The collection and analysis of experimental data reveal that, compared to traditional teaching models, the new model shows significant advantages in multiple aspects such as students' academic performance, practical ability, and learning attitudes. Specifically, students in the experimental group scored significantly higher in theoretical tests and practical skills assessments than those in the control group, indicating that the SPOC-based flipped classroom effectively bridges the gap between theory and practice. Students acquire a knowledge foundation through pre-class self-study and apply the theory to real-life problems during flipped classroom activities such as case analysis and situational simulations, thus improving the depth of understanding and transferability of knowledge. Moreover, students in the experimental group showed better classroom participation and learning initiative. The highly interactive environment of the flipped classroom stimulated students' learning interest and intrinsic motivation, especially through task-driven activities and immediate feedback, which encouraged students to think independently and actively engage in group discussions and practical operations.

From the analysis of learning data, the learning behavior data recorded on the SPOC platform show that experimental group students invested more time in self-study during the pre-class phase and used the tests provided by the platform to identify and fill knowledge gaps. The data also indicate a positive correlation between the diversity of learning behaviors and academic performance, with students who actively participated in assessments, watched video resources independently, and reflected after class performing better in final assessments. This highlights the important role of the interactive feedback mechanism and personalized resource design in improving learning outcomes. Additionally, survey and interview data show that most students in the experimental group were highly satisfied with the teaching model, believing that it enhanced their understanding of knowledge and helped develop practical skills and critical thinking. Teachers' feedback corroborated this, with teachers acknowledging that the flipped classroom provided more opportunities for personalized teaching and student-teacher interaction, effectively addressing students' diverse needs.

7. Conclusion

The research demonstrates that integrating SPOC and flipped classrooms in internal medicine nursing education can effectively promote the development of students' theoretical knowledge, practical skills, and critical thinking. Moreover, an interactive feedback mechanism can optimize learning outcomes, enhance engagement, and facilitate teaching adjustments based on real-time data. However, challenges, such as addressing the self-learning limitations of some students and adapting teaching strategies to diverse learner needs, remain. Future research should focus on refining the feedback mechanisms, enhancing teacher training, and expanding the application of this model to other nursing disciplines, to contribute further to nursing education reform.

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