

# Application of Sandwich Teaching in the Theoretical Teaching of Fundamental Nursing

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**Abstract:** **Background:** The sandwich teaching method originated in the United Kingdom, and is characterized by interspersing group discussion and cross learning between group learning and individual learning to improve the learning effect. This article discusses the application of sandwich teaching in the basic teaching theory of nursing after junior college. **Methods:** A total of 139 nursing students who were promoted to the college level of 2018 were selected as the research subjects, of which sections 1 and 2 were the experimental group, and sections 3 and 4 were the control group. The experimental group received sandwich teaching, and the control group received traditional teaching. **Result:** After the course, the theoretical scores, self-efficacy scores and critical thinking scores of the two groups were compared. The theoretical scores, self-efficacy scores, and critical thinking scores of the experimental group were higher than those of the control group ( $p < 0.05$ ). **Conclusion:** Sandwich teaching can improve students' academic performance, self-efficacy and critical thinking ability.

**Keywords:** Sandwich Teaching; Theoretical Teaching ; Fundamental Nursing

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## 1. Background

The sandwich teaching method originated in the United Kingdom, and was applied to medical education for the first time at the Heidelberg University School of Medicine in Germany<sup>[1,2]</sup>. The sandwich teaching method is an interspersed learning method, that is, interspersing elements such as group discussion, cross learning, and reporting between group learning and individual learning. Many studies have suggested that this teaching method can cultivate students' enthusiasm for learning, the habit of thinking about problems, and improve analytical skills. The ability to solve problems makes learning more effective<sup>[3-6]</sup>.

"Nursing Foundation is a mandatory professional basic course for nursing students, which serves to lay a solid theoretical and practical foundation for specialized nursing study and future career development<sup>[7]</sup>. However, for students who are upgrading from junior college, educators face certain challenges in attracting their interest in learning<sup>[8]</sup>. In order to improve the teaching effect, the basic nursing teaching and research section of our school has been exploring from the revision of the teaching plan and teaching content to the deletion of teaching hours and the improvement of teaching methods. In this study, we applied the sandwich teaching method among the 2018 college students and achieved good results.

## 2. Methods

**Research object** In theory teaching, we generally adopt a combined class, that is, sections 1 and 2 are taught together, and sections 3 and 4 are taught together. We assigned the 76 students in sections 1 and 2 as the experimental group, and the 85 students in sections 3 and 4 as the control group. In September 2018, there were a total of 161 students who passed the entrance examination of our college. Of the 76 students in the experimental group, 4 students were unable to continue school due to illness, so there were only 72 students, comprising 2 males and 70 females. Of the 85 students in the control group, 1 person dropped out for an unknown reason, leaving 84 students, comprising 81 females and 3 males. There was no statistical difference between the two groups of nursing students in general data, such as admission scores, age, and gender ( $p > 0.05$ ).

## 2.1 Selection of Teaching Materials and Content

The two groups were trained in accordance with the 2017 version of the training goals for upgrading to undergraduate education, and the 2017 version of the basic nursing syllabus. The textbooks and teaching material were basically identical. The teaching materials were selected from the 2017 edition of Basic Nursing Teaching Materials of People's Medical Publishing House. The teaching content includes environment, hospital infection prevention and control, rest and activities, measurement of vital signs, diet and nutrition, excretion, intravenous infusion, and rescue of critically ill patients 10 chapters such as nursing, pain nursing, hospice care, etc., for a total of 20 class hours. The teaching time of the control group lasted from October 2018 to December 2018, and the testing period occurred in January 2019. The theory class meets once per week, and each meeting is 2 class hours (90 minutes).

## 2.2 Control Group

The traditional teaching mode was adopted, and teachers mainly used Powerpoint (PPT) and other methods to teach. According to the teaching order of teaching objectives, key points, difficulties, introduction of related theoretical knowledge, clinical cases, and summary, the students occasionally watched videos and answered questions.

## 2.3 Experimental Group

Pre-class preparation for the teaching and research section: There were 9 full-time teachers in the basic nursing teaching and research section, including 3 professors, 1 with a doctoral degree, 6 with a master's degree, and 6 with dual professional titles. The teaching and research section selected 2 teachers to serve as the theoretical teaching of junior college promotion, 2 teachers are intermediate professional titles, the teaching age is 5 years, the teaching level is basically the same, 1 is responsible for the theoretical teaching of 1-2 classes, and one is responsible for the theoretical teaching of 3-4 classes. The other teacher's resources for theoretical and practical teaching were similar. Before the start of class, the teachers prepared and discussed collectively, and decided to reform part of the teaching content of the experimental group. Five chapters were chosen, such as the measurement of vital signs, intravenous infusion, rescue and care of critically ill patients, pain care, and hospice care, for application of the sandwich teaching method.

## 2.4 Teaching process

The sandwich teaching method includes 7 links including teacher's opening remarks, group discussion among nursing students, cross-study of nursing students, student reports, teacher lecture, goldfish bowl, summary, and feedback. The teacher uses the rescue of critically ill patients (90 minutes of teaching time) as an example. The process is illustrated below.

The teacher's opening remarks (6 minutes): The teacher starts with "Dear students, have you encountered or participated in the rescue of critically ill patients before your internship? What kind of situation was it at that time?" Definition and characteristics, how to rescue, how to care, etc. raise 4 questions, Question A: "From your previous internship experience, tell me in which wards have you encountered critically ill patients? What kind of patients do you think are critically ill patients? What are their characteristics?" Question B: "What verbal orders did the doctor give? How did you or your teacher rescue the patient? What do you think are the common rescue techniques?" Question C: "What rescue drugs were used in the doctor's order? What was the route of administration? What do you think is the purpose of using these rescue drugs?" Question D: "Was the rescue successful at the time? If so, talk about the reasons for the successful rescue and after the rescue was successful. What other care measures have been taken? If the rescue was not successful, what are the possible reasons for your failure?"

Group discussion (12 minutes): Divide 72 students into 8 groups, named AI, AII, BI, BII, CI, CII, DI, DII, with 9 people in each group. Using the AI group as an example, the students are numbered as AI1-AI9. All nursing students with the same letter will discuss the issue of the same letter. For example, the AI and AII groups will discuss the issue of A. The teacher designates the number 9 as the group leader, and the group leader needs to record and organize the main points of the discussion. See Table 1 for specific grouping and discussion questions.

Cross-learning (10 minutes): In addition to the group leader, students numbered 1-8 need to go to other groups, such as AI1, AI2 to BI, AI3 to BII, AI4, AI5 to CI, AI6 to CII, AI7 to DI, AI8 to DII group. In this way, a new group is formed to discuss issues with the group leader, who will record and integrate the two discussions.

Student report (15 minutes): All students return to their original group and report on the results of the discussion with the other groups. For the same problem, one group leader will report and the other group leader will supplement. If the teacher invites the AI group leader to report the A problem, the AII group leader will add more.

Teacher's Lecture (15 minutes): Focusing on the teaching objectives, with 4 questions as the main line, analyze and summarize the important rescue techniques of cardiopulmonary resuscitation and gastric lavage, and summarize commonly used rescue drugs and their effects.

Establish a "gold fish bowl" (15 minutes): The teacher puts forward a clinical case and problem to test the students' problem-solving abilities. Case: The patient was sent to the Department of Comprehensive Internal Medicine. The patient is a 77-year-old man with a gray complexion, a poor response, a heart rate of 50 beats per minute, blood pressure almost undetectable, a history of diabetes and coronary heart disease, living alone, and usually taking medications. Regularity, at this moment, please judge what might happen to the patient? What rescue measures should be implemented? What rescue drugs may be used? What does nursing diagnosis include? How to provide care? For such a patient, what do you think you should pay special attention to when nursing? The teacher asks the number 6 students to form a new group for discussion, and other students are listening or thinking.

Summary (10 minutes): The teacher and classmates analyze cases, answer questions, and summarize the key and difficult content of this study.

Feedback, Q&A, homework assignment (7 minutes): Ask 1 to 2 students to talk about their feelings during this class. If students have any questions, they can ask and answer them during this time. At the same time, assign homework assignments. Students are asked to search the Internet based on what they have learned in this lesson, which are relatively new clinical rescue techniques.

### **3. Observation Indicators**

#### **3.1 Theoretical results**

The School of Nursing organizes theoretical assessments, and the final exam implements separation of teaching and testing, that is, teachers who are not designated by the teaching and research section who are not in the theory of junior college will randomly select multiple-choice questions from the question bank (30, 30 points), and fill-in questions (10, 10 points), Noun explanation (5 items, 20 points), short answer questions (5 items, 20 points in total), and an essay question (1 item, 20 points). After the teacher prepares the exam, it is compared with the exam from the previous year to keep the difficulty basically the same. Then, 2 teachers analyze the content to ensure that the repetition rate of the content does not exceed 10% and the difficulty is similar. Lastly, the director of the teaching and research section reviews the exam. At the end of the exam, the exam is reviewed by the teaching and research team in accordance with a unified scoring standard, with a full score of 100.

### **4. Questionnaire Survey**

After the course is over, the teaching and research team give out questionnaires to the students, who fill them out anonymously, and return them on the spot after 30 minutes. A total of 156 questionnaires were issued and 156 valid questionnaires were recovered, with an effective recovery rate of 100%. The questionnaire includes a general self-efficacy scale and a critical thinking ability scale (Critical Thinking Disposition Inventory-Chinese Version, CTDI-CV).

The general self-efficacy scale was compiled by the German scholar, Schwarzer (Zhang J X,etal.,1995) <sup>[9]</sup>. The Chinese version of GSES Cronbach's coefficient is 0.87, the half-fold coefficient is 0.78, and the test-retest reliability is 0.83. The correlation coefficient between the 10 items and the total scale was between 0.60-0.77. The scale uses the Likert 5-level scoring method, which sets 1 point as completely incorrect and 4 points as completely correct, and both are positive scoring.

The higher the score, the stronger the general self-efficacy. The total score of 10 items divided by 10 is the item score. The median value is 2.5. A score of <2.5 indicates that the individual is average and self-efficacy is at a moderately low level. A score of 2.5-3.0 is considered to be a medium level, and a score of >3.0 is considered a medium level. This study adopts the Chinese version translated and revised by Wang Caikang et al<sup>[10]</sup>, and its internal consistency Cronbach's  $\alpha$  coefficient is 0.87, indicating that the scale has good reliability.

The critical thinking ability measurement table was translated and revised by Peng Meici of Hong Kong Polytechnic University and others<sup>[11]</sup>. It includes 7 dimensions: seeking truth, open mind, analytical ability, systematic ability, self-confidence in critical thinking, curiosity, and cognitive maturity. Degrees, each dimension has 10 entries. Among them, there are 30 positive entries and 40 negative entries. The answers to each item are divided into six levels: highly agree, agree, slightly agree, slightly disagree, disagree, strongly disagree. Positive items are counted as 6-1 points, and negative items are counted as 1-6 points.

## 5. Statistical Methods

Using SPSS 23.0 software, counting data adopts  $\chi^2$  test, measurement data adopts normal distribution, measurement data comparison adopts  $t$  test, non-normal distribution measurement data comparison adopts U nonparametric test, and the test level is  $\alpha=0.05$ .

## 6. Results

Comparison of the theoretical performance of the two groups in the nursing foundation course.

Table 1. Comparison of the final theoretical scores of basic nursing between the two groups ( $\bar{x} \pm s$ , points)

Group	Theoretical score	$t$	$P$
Experimental Group(n=72)	89.18 $\pm$ 3.79	7.917	0.000
Control group(n=84)	84.32 $\pm$ 3.85		

Table 2. Comparison of the self-efficacy scores between the two groups ( $\bar{x} \pm s$ , points)

Group	self-efficacy score	$t$	$P$
Experimental Group(n=72)	3.53 $\pm$ 0.17	15.211	0.000
Control group(n=84)	3.15 $\pm$ 0.13		

Table 3. Comparison of critical thinking ability scores between the two groups ( $\bar{x} \pm s$ , points)

Dimension	Experimental Group(n=72)	Control group(n=84)	$t$	$P$
Find the truth	45.56 $\pm$ 4.73	43.31 $\pm$ 3.59	3.296	0.001
Open mind	41.42 $\pm$ 4.93	42.40 $\pm$ 4.37	1.314	0.191
Systematic ability	42.32 $\pm$ 3.34	42.15 $\pm$ 5.56	0.228	0.820
Self-confidence of critical thinking	44.61 $\pm$ 4.72	39.59 $\pm$ 3.54	7.399	0.000
Curiosity	45.01 $\pm$ 4.40	42.94 $\pm$ 3.78	3.126	0.002
Cognitive maturity	44.68 $\pm$ 4.72	43.97 $\pm$ 3.07	1.085	0.280
Total score	307.92 $\pm$ 13.20	280.49 $\pm$ 9.52	7.216	0.000

## 7. Discussion

It can be seen from Table 1 that the basic nursing score of the experimental group is higher than that of the control group, which may confirm the effectiveness of the sandwich teaching method. This is similar to the reports of Yang Li<sup>[4]</sup> and Zhang Rui<sup>[5]</sup>. The students who enter the undergraduate program are excellent students from colleges and universities, and they have strong flexibility. Therefore, as long as the teachers use proper methods, the improvement of students' performance will be more obvious, such as in the average score of the experimental group (88.90 $\pm$ 3.72). In addition, some studies suggest that the learning efficiency of students in traditional teaching is low, and teaching others to learn, sandwich teaching method, can

make students maintain a higher memory rate <sup>[12]</sup>. This is because traditional teaching is mainly taught by teachers, and students are expected to merely listen and watch. However, college students are not a blank paper in professional learning. For those who have had learning and internship experience, repeating the original learning content will cause them to feel that the classroom is boring <sup>[13]</sup>; meanwhile, the sandwich teaching method is student-centered, connecting and applying previous experiences and old knowledge learned, allowing students to actively participate in problem-based group discussions and cross-discussions. In the learning method of sorting out problems, summarizing and reporting knowledge, the retention of knowledge is more durable. Furthermore, Chinese students in traditional classrooms are more likely to sit quietly <sup>[14]</sup>, but at present, due to the development of mobile phones and the Internet, it is possible for students to be engaged on their mobile phones, such as chatting on WeChat<sup>[15]</sup>. In contrast, the sandwich teaching method allows students to ask questions, and set up multiple links such as group discussion, cross-discussion, etc., to keep students' attention in the classroom, to learn from one another, to learn from other things, to have a solid understanding of knowledge, and to achieve better academic performance.

Undergraduate education is a new teaching mode of higher education. It provides a higher platform for college students who are willing to continue pursuing their learning experience, and are willing to choose the latter in careers and studies. They have a clearer understanding of themselves and are more interested in studying. The goal is relatively clear, and students who can pass the entrance examination for college promotion have relatively good scores, strong mobility and relatively high overall quality<sup>[16]</sup>. This may be the reason why the self-efficacy scores of our college's undergraduate students are at 3 points or above. It can be seen from Table 2 that the self-efficacy score of the experimental group is higher, which is similar to Wang Hui's research<sup>[17]</sup>. This sandwich teaching method uses thinking, discussion, and reporting to facilitate learning, allowing students to have a better experience by learning in exploration, solving problems in learning, training their ability to act and work efficiently, and enhancing their confidence in accomplishing their goals. Improved self-efficacy. Successful experience is the most effective way to improve self-efficacy<sup>[18]</sup>. In the classroom, students are centered and questions are guided to allow students to actively think and participate in exchanges and discussions. At the same time, group reports and experience sharing are increased. The learning experience has improved their interest learning and their self-efficacy in learning.

Table 3 shows that the students in the experimental group outperform the control group in terms of their analytical ability, self-confidence in critical thinking, and thirst for knowledge, which is similar to previously published reports<sup>[4,6]</sup>. The problem is too simple to arouse the interest of the undergraduate students, so we have prepared more meticulously. Whether it is the opening remarks or the problem design of the group, it is essential to review our internship experience and consider the knowledge learned. It has certain challenges and stimulates the students' curiosity <sup>[19,20]</sup>. Group discussion, cross-discussion, and group report is the exchange process of a students' self-thinking and other people's thoughts, which exercises the students' thinking ability<sup>[4]</sup> and language expression ability<sup>[19,20]</sup>. The case of the goldfish bowl is related to clinical practice. Practical, but the difficulty is further increased. Ask students integrate their knowledge to solve practical problems, apply the theory to the clinic, do and learn by doing, find problems, analyze and solve problems, and improve students' critical thinking ability <sup>[4,6]</sup>. Step by step, interlocking and progressive, the diversified teaching design allows students to fill the classroom teaching content, and the teaching methods and methods are not monotonous, such as bread with sausage and cheese, rich in ingredients and diverse tastes, so that the teaching is carried out. The sequence is also interesting <sup>[4]</sup>.

## 7. Disadvantages

The sandwich teaching method was only partly implemented in this study. On the one hand, we considered that the appropriate teaching content needed to be selected, as some content is not easy to carry out. On the other hand, it is difficult to implement the sandwich teaching method. Teachers need to carefully prepare the opening remarks and design the questions and goldfish bowls. It may be possible to organize the teaching content again, fully implement the sandwich teaching method, and then observe whether the teaching effect can be more reasonable to judge its teaching effect.

## 8. Summary and Suggestions

There have been many studies, including basic medicine<sup>[21]</sup>, clinical teaching<sup>[20,22-25]</sup> or nursing teaching<sup>[26-31]</sup>, which affirmed the effectiveness of the sandwich teaching method in medical teaching. Although only part of the teaching content of this study used the sandwich teaching method, the results show that this reform had a positive impact on a student's academic performance, self-efficacy and critical thinking ability, thereby providing further reference for nursing teaching reform.

The subject of this research is mainly college students who have a certain professional foundation and have a certain impression of the teaching content. However, for ordinary undergraduate students, if the sandwich teaching method is used, students need to be aware of the learning content in advance and spend the necessary time doing preparatory work. Additionally, participation in the discussion is better than passive listening. Secondly, the classroom is divided into several links, teachers should carefully prepare, fully design the teaching content and programs, strictly control each link and time, and control the teaching process. It is difficult to grasp the teaching case of the goldfish bowl. For students upgrading from junior college to undergraduate, the relative design must be relatively difficult. Otherwise, it will not arouse students' interest, and students will not think and actively participate. Additionally, the class size should not be too large, but the number of students taught this time is already very large. Limited by the length of teaching, there are group discussions and cross-learning links during the period. Although there are multiple forms, it is easy to fall into chaos. Teachers must maintain the teaching order so that the group members can quickly get into position and enter the state, and also guide students to think only by encouraging students to actively participate in speaking so that the teacher can proceed smoothly.

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