

# Teaching Health Assessment Symptomatology Using a Flipped Classroom Combined With Scenario Simulation

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## ABSTRACT

**Background:** Symptom assessment is difficult to understand and be retained by second-year bachelor's nursing students. A flipped classroom combined with scenario simulation (FCSS) is a new potential teaching model. This study compares the teaching effect and knowledge retention between the FCSS approach and the traditional flipped classroom (FC) approach. **Method:** Second-year bachelor's nursing students were selected as research participants. One group ( $n = 59$ ) adopted an FCSS approach, whereas the other group ( $n = 68$ ) adopted an FC approach. We evaluated student mastery and retention of knowledge through two tests: one before the next class, the other after 2 months. **Results:** Regarding knowledge mastery, the FC group had a higher score than the FCSS group both in total score ( $66.29 \pm 15.27$  versus  $59.42 \pm 10.76$ ) and group learning score ( $46.06 \pm 13.25$  versus  $38.47 \pm 8.22$ ) in the first test ( $p < .05$ ). The retention of knowledge in the FCSS group was better than that in the FC group ( $p < .001$ ), represented by the variable of test score difference before and after 2 months. **Conclusion:** When teaching symptomatology, FCSS is helpful to enhance self-learning and improve student long-term memory. [*J Nurs Educ.* 2020;59(8):448-452.]

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Health assessment is a bridge between basic and clinical nursing courses. Patient symptoms will be aggravated or decreased as a disease progresses or is alleviated by treatment. It is vital to make a comprehensive assessment of a patient's existing or potential health problems, and it is important for nursing students to master the symptoms of some common diseases. Nursing students usually start to learn health assessment in the first semester of the second academic year. They study pathophysiology in the second semester of their freshman year, which may help them to understand why such symptoms occur in a given state of illness. But these second-year bachelor nursing students have not yet systematically studied professional clinical course work or obtained first-hand clinical knowledge, so it is difficult to understand and master the relevant knowledge only through a teacher's explanation; this does not facilitate long-term memory if the nursing students are not involved in active thinking and active learning. Therefore, it is useful to change the teaching method.

Classroom flipping was born with the development of the internet and is a new teaching mode. At the beginning of the 21st century, classroom flipping became popular in American education and then was gradually introduced to China, at first for primary and secondary education (Shen et al., 2015). Many curricula use the teaching method of flipping classrooms, and most of them have achieved optimal results (Morgan et al., 2015; Tune et al., 2013). Peisachovich et al. (2016) applied classroom flipping to an undergraduate nursing program at the University of Ontario. They found that flipping the classroom helped students to learn more deeply. Wang et al. (2018) used classroom flipping to teach emergency nursing and found that the teaching mode not only improved the teaching effect, but also helped to cultivate student abilities of self-learning and problem solving. Qin et al. (2018) found that flipping the classroom based on microlessons is helpful to improve student interest in learning and enhance their sense of teamwork. Intel Global Director of Education (Gonzalez, 2011) concluded that flipping a classroom can make students more comfortable in choosing to learn new knowledge outside the classroom. This not only changes the traditional teaching mode, but also makes students have a clear understanding of the weak points in their knowledge in the early self-study process. It can provide timely feedback through late classroom learning, which also strengthens the communication between teachers and students.

Brown et al. (1989) put forward the concept of scenario simulation in 1989. This teaching method is student centered

and achieves teaching objectives by allowing students to experience a simulated situation without assuming the risks that may arise from reality (Rauen, 2001). This allows students to develop skills and manage clinical situations autonomously without fear of being assessed or making mistakes (Felton & Wright, 2017). This teaching method is practical and economical and promotes interactions, collaboration, and interest (Yang, 2018). Relevant research (Holdsworth et al., 2016; Lapkin et al., 2010; Zapko et al., 2018) has shown that scenario simulation improves student knowledge acquisition, analysis, attitude, and interpersonal communication. It is also conducive to the understanding and application of knowledge. It can enhance student self-confidence in handling problems and improve critical thinking, further enhancing interpersonal communication and expression. Ma et al. (2012) have shown that scenario simulation can significantly improve student communication and health assessment abilities when studying community health education.

The aim of the current study was to explore the teaching effect and student retention of knowledge when using classroom flipping combined with scenario simulation.

## Method

### Setting and Participants

Second-year bachelor's nursing students from a medical university were selected as research objects. The two classes were randomly assigned by the educational administration system. One class consisted of 68 students in a flipped classroom (FC group), 7 males and 61 females. The other class consisted of 59 students in a flipped classroom combined with scenario simulation (FCSS group), 16 males and 43 females. Students of both groups took the National College Entrance Examination and completed the first half course of basic nursing.

To determine that the two groups were at an equal learning level, we measured the autonomous learning ability for both groups. The autonomous learning ability of nursing undergraduates in the two classes was assessed by the Instrument of Competencies of Autonomous Learning of Nurse Students prior to the class (Lin & Jiang, 2004). The scale consists of three subscales: self-management ability, information ability, and learning cooperation ability. The purpose of this instrument is to test whether there are differences in competencies of autonomous learning between two groups of students. There are 28 questions in the test. The higher the score, the stronger the self-learning ability. The two groups of students were given the same teaching content and assigned a unified textbook, *Health Assessment* (Wang & Wen, 2016). After sorting out and discussing the teaching objectives and contents of the course, the teachers arranged the course according to the whole body/general symptoms, respiratory symptoms, circulatory symptoms, digestive symptoms, and urinary symptoms. Twelve symptoms including fever, pain, disturbance of consciousness, dyspnea, hemoptysis, cyanosis, edema, palpitation, dysuria, hematemesis, melena, and jaundice were identified. Fever, pain, and disturbance of consciousness were taught by teachers using conventional teaching methods with multimedia courseware. The main contents included clinical manifestations, the key points of inquiry,

nursing problems, and relevant quizzes. The latter nine symptoms were studied in the flipped classroom (FC) or flipped classroom combined with situational simulation (FCSS) by the students themselves.

## Intervention

### FC Design

The FC group consisted of 68 students, divided into nine groups, and each group consisted of seven to nine students. The teaching method of the flipped classroom was adopted, including the following interventions:

- Students learned knowledge points in the Course Center before class;
- they prepared a case of typical symptoms on their own;
- they summarized the main points of inquiry and presented these points for attention of the symptoms through PowerPoint® in class;
- they prepared five to 10 quiz questions for each symptom; and
- finally, the teachers gave comments and summary explanations. Each group was responsible for one symptom. The tasks of each group included 15 minutes of symptoms discussion and 15 minutes of exercises and discussions. Other groups took part in the discussion at that stage to learn together instead of focusing on one symptom of their own responsibility.
- In addition, they all joined a WeChat group managed by a teaching assistant, where they could give feedback on classroom questions and opinions on the course at any time.

### FCSS Design

The FCSS group consisted of 59 students, divided into nine groups, and each group consisted of six to eight students. The intervention method was added to the FC group. Students simulated the situation of inquiry in class and played the roles of patients, family members, or medical staff to show the main points of symptoms. The tasks assigned to the FC and FCSS groups differed over time. The tasks of each group included 10 minutes of inquiry (scenario simulation), 10 minutes of symptomatic discussion, and 10 minutes of exercises and discussion.

### Data Collection

We measured the learning effects with test scores. After the completion of the symptom assessment part of the course, the two groups were tested before the next class, and tests were completed within the prescribed time. The test was divided into the teacher's teaching part and students' self-study part. The examination questions were all multiple choice. The teacher's lecture section (TLS) part had 14 questions with 28 points, and the group learning section (GLS) had 36 questions with 72 points, for a total of 100 points. After 2 months, the two groups were tested again with the same questions to examine their retention of knowledge. During the 2-month period, students continued to study the follow-up course of health assessment and spent the winter on vacation. Retention of knowledge was represented by the variable of test score difference before and after 2 months.

**TABLE 1**  
**Comparison of Symptoms Assessment Test Scores Between the Two Groups**

Item	Class		t/z	p
	FC	FCSS		
	$\bar{X} \pm S$	$\bar{X} \pm S$		
TS of the first test	66.29 ± 15.27	59.42 ± 10.76	-2.528	.011
TS of the second test	59.65 ± 13.78	60.20 ± 9.82	-0.264	.792
TLS of the first test	20.24 ± 3.79	20.95 ± 4.07	-0.966	.334
TLS of the second test	20.68 ± 4.30	22.27 ± 3.33	-2.039	.041
GLS of the first test	46.06 ± 13.25	38.47 ± 8.22	-3.042	.002
GLS of the second test	38.97 ± 11.89	37.93 ± 8.63	0.556	.579

Note. FC = flipped classroom; FCSS = flipping classroom combined with scenario simulation; TS = total score; TLS = teacher's lecture section; GLS = group learning section.

### Data Analysis

SPSS<sup>®</sup> version 24.0 was used for analysis. The metrological data are expressed as  $\bar{X} \pm S$ . If the test scores of the two groups were normally distributed, independent sample *t* tests were used. Otherwise, the Wilcoxon rank sum test was used. Differences were considered statistically significant at  $p < .05$ .

### Results

#### Comparison of the Autonomous Learning Ability Between the Two Groups

We evaluated the autonomous learning ability of students in the two classes. The score of the FC group was  $3.46 \pm 0.34$ , and that of the FCSS group was  $3.36 \pm 0.42$ . The results showed that there was no statistical difference between the two groups in their self-learning ability ( $p > .05$ ), and their scores were higher than the national norm for nursing students ( $p < .001$ ), which is  $3.10 \pm 0.35$  (Mao & Jiang, 2016).

#### Comparison of Scores of Knowledge Mastery Between the Two Groups

In terms of the average total scores on the first test, students in the FCSS group had an average total score of  $59.42 \pm 10.76$ , and students in the FC group had an average total score of  $66.29 \pm 15.27$ . In terms of the GLS of the first test, the score in the FCSS group was  $38.47 \pm 8.22$ , and the score in the FC group was  $46.06 \pm 13.25$ . The total score and GLS scores in the FC group were both higher than those in the FCSS group. In terms of the teacher's teaching section (TLS) in the second test, the score in the FCSS group was  $22.27 \pm 3.33$ , and the score in the FC group was  $20.68 \pm 4.30$ ; this difference was statistically significant ( $p < .05$ ) (Table 1).

#### Comparison of the Degree of Knowledge Retention Between the Two Groups

The differences ( $\Delta$ ) between the scores on the first test and the second test were calculated and compared between the FC and FCSS groups. Statistical analysis showed that knowledge retention of the students in the FCSS group was better than that

of students in the FC group, and the difference was statistically significant ( $p < .01$ ) (Table 2). There was no statistical difference in the scores between the two examinations of the teacher's teaching section.

### Discussion

#### FCSS Teaching Methods and Challenges for Students

Many studies have shown that the effects of classroom flipping and scenario simulation are beneficial. For example, Haugland and Reime (2018) found that repeated scenario teaching can improve communication skills and moral reflection of nursing students in dementia nursing research. Burns (2012) argued that classroom flipping can potentially improve medical students' critical thinking abilities. Kim et al. (2019) found that the flipped classroom used in a patient safety course was effective in improving patient safety competency in terms of attitude, skills, and knowledge among undergraduate nursing students. In a systematic review and meta-analysis by Xu et al. (2019), the FC method was more effective for the nursing students' skill competency than traditional teaching in China. Our research shows that flipping the classroom has immediate advantages compared with the FCSS teaching method. A possible reason is that there were some shortcomings in the class schedule in the FCSS group. Because the two groups had been assigned the same preparation time, the students who were in the FCSS group had to cut off some quiz question time and leave some time to prepare for the scenario simulation. However, most of the questions in the first and second tests were from the quiz questions that the students themselves prepared and explained. This may have led to the lower scores in the FCSS class, compared with the FC class.

On the other hand, the combination of FCSS teaching does not leave students unprepared for classroom learning. It emphasizes students' autonomous learning ability, communication and cooperation, and innovative expression. Students may feel pressured when subject to this teaching method because they need to complete a lot of extra work, they must change from passive learning to active learning, and they become more independent

**TABLE 2**  
**Comparison of Knowledge Retention Between the Two Groups of Students**

$\Delta$ = Second Score – First Score	Class	n	M $\pm$ SD/Rank Mean		p
			Value <sup>a</sup>	t/z	
T $\Delta$	FC	68	-6.65 $\pm$ 11.56	-4.172	< .001
	FCSS	59	0.78 $\pm$ 7.84		
TL $\Delta$	FC	68	61.09	-0.969	.333
	FCSS	59	67.36		
GL $\Delta$	FC	68	53.02	3.619	< .001
	FCSS	59	76.65		

Note. FC = flipped classroom FCSS = flipping classroom combined with scenario simulation; TS = total score TLS = teacher's lecture section; GLS = group learning section.  
<sup>a</sup> The scores are normally distributed. Rank mean value means that the scores are nonnormally distributed.

(Post et al., 2015). This may increase the burden of learning and anxiety so that the teaching effect is not as satisfactory. Researchers have found that although FC teaching is effective, students' satisfaction is not as high as for other teaching methods (Missildine et al., 2013) and some students prefer traditional classes (Hanson, 2016).

#### **FCSS and Improved Student Knowledge Retention**

For the degree of knowledge retention, FCSS was better than the simple FC method. Zhang and Ding (2016) found that the rate of knowledge retention when using a novice chemistry teacher was closely related to learning time and learning style. Scenario simulation methods can make students strongly relate to new knowledge when they are exposed to it for the first time and deepen their understanding in a flipped classroom environment.

Because the evaluation of symptoms is obtained by inquiry, students can have a better understanding of symptoms and better long-term memory, and they forget less through scenario simulation.

Xu and Wang (2014) also believe that situational teaching, which combines theoretical knowledge with practice, can enhance student memory and understanding. However, Kameg et al. (2013) used high-fidelity simulations in the teaching of mental nursing. They found that the level of students' knowledge and retention of knowledge did not improve, but the students responded positively to the simulated experiences, indicating that it helped them better understand nursing concepts.

Scenario simulation requires students to evaluate and confront difficulties in the course of health assessment with specific problem scenarios. It enables nursing students to simulate diseases and medical treatments through the role-playing of self-written scripts. It facilitates student autonomy and creativity; integrates cognitive, emotional, imaginative, and abstract thinking; and challenges the students' simple acceptance of knowledge.

Feedback from students suggested that a flipped classroom combined with interesting scenario simulation could help them master knowledge, especially the knowledge that their group

was responsible for and the knowledge that interested them. Through the process of scenario simulation, students can understand and master theoretical knowledge more systematically and comprehensively to be better prepared for clinical practice. The FCSS group's scenario simulation made students master knowledge not by rote memorization but by more perceptual cognition, which helps memories become more deeply internalized.

Further research may be needed to clarify the underlying mechanism. The scores of the second teacher's teaching section part (TLS) in the FCSS group were higher than those in the FC group. It is also possible that students in the FCSS group learned lessons from their first unsatisfactory performance. During the winter vacation, they reviewed the relevant knowledge points of health assessment, so they got better results on the test after 2 months.

#### **Conclusions and Limitations**

The student-centered FCSS teaching mode gives students greater autonomy, promotes initiative, and aids in knowledge retention. In future studies, we will pay more attention to the arrangement of class hours, taking into account personalities and autonomous learning abilities of students, and actively guide their roles in the classroom to give them enough time to prepare and digest knowledge after class.

There are some shortcomings in the evaluation methods used here. We did not adopt a conventional teaching mode and therefore cannot conclude whether the FCSS or the FC mode is better than the conventional mode. Although the arrangement of the classes was randomly selected by the educational administration system, in order to keep the same number of symptoms assigned to each class, the number of team members in the two groups was inconsistent, differing by one or two, which may have had an impact on the corresponding results. Another shortcoming is that we used objective results to evaluate the teaching effect, whereas the students' evaluation of the course was obtained from the WeChat feedback, which lacks strict qualitative standards. In the future, we will use more diversified methods to evaluate the course and further

focus on students' personal abilities and their perceived experience of the curriculum.

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