



# Influence of Flipped Classroom Method on Nursing Students' Learning Approaches

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## Abstract

**Background:** Active learning approaches, including the flipped classroom, can enhance meaningful learning among students of medical sciences.

**Objectives:** The purpose of this study was to investigate the effect of the flipped classroom teaching method on nursing students' learning approaches.

**Methods:** This one-group quasi-experimental study with a pretest-posttest design was carried out among 46 undergraduate nursing students who had passed the orthopedic nursing course in the academic year of 2017-2018. The participants were selected by the census method. To teach through the flipped classroom method, the instructor provided electronic content for the course using the Articulate Storyline software. Students studied electronic contents and the reference book prior to each session and participated in predetermined collaborative activities. Data were collected using the Revised Two-Factor Study Process Questionnaire (R-SPQ-2F) before and after the completion of the classes. Data were analyzed using descriptive statistics, independent *t* test, paired *t* test and Pearson correlation coefficient by SPSS software.

**Results:** The flipped classroom method significantly increased the deep learning approach ( $P < 0.001$ ) and its subscales including deep motive ( $P < 0.001$ ) and deep strategy ( $P = 0.001$ ). Also, there was a significant negative correlation between deep learning and superficial learning before ( $r = -0.29$ ,  $P = 0.047$ ) and after ( $r = -0.34$ ,  $P = 0.015$ ) the implementation of the flipped classroom method.

**Conclusions:** By implementing the flipped classroom method, deep learning among nursing students is strengthened. Also, by assessing learners' study approaches, it is possible to identify the various educational methods that affect deep learning.

**Keywords:** Deep Learning, Active Learning, Nursing Education

## 1. Background

The goal of nursing education is to prepare students for safe nursing practice. To provide safe care for patients with complex health needs, students must have a strong knowledge base, critical thinking ability, judgment and clinical reasoning ability, and problem-solving and decision-making skills in providing care (1). Nursing instructors can provide the conditions for developing these skills as well as professional development and deep learning opportunities for students by employing active approaches to classroom and clinical settings (2, 3). Traditionally, nursing education has been based on a behavioral model that has not resulted in improved educational performance (4). It is a teacher-centered approach and results in superficial learning. The outcome of such training is students who merely memorize the information for a short while and are unable to integrate new information with

their basic knowledge (5).

Learner-centered approaches include active learning methods, which often lead to deep learning, that is, long-term retention of data and the ability to apply them. In contrast, in traditional teacher-centered classrooms, the instructor passes the content through lectures to passive learners and fosters superficial learning (6). One of the most comprehensive approaches that has been taken into account in nursing education in recent years is the flipped classroom approach (7), that is, the reversal of the classroom to replace traditional teaching methods with collaborative and interactive activities (8). In this method students learn the content prior to attending the class, and the class time is spent on exercises and the use of the lessons learned (9). The results of studies on the use of flipped classroom in the field of nursing education have shown that learners are satisfied with this educational method (10), and clinical decision making (11), orientation

(12), and critical thinking skills (13) are strengthened in this method.

Instructors provide the conditions for deep and meaningful learning through educational methods that enable learners to work and think at different cognitive levels (14). Ausubel et al. (15) and Cavallo et al. (16) defined meaningful learning as the process of making connections between the newly learned concepts and the previously learned ones and emphasized on appropriate learning environment for deep and meaningful learning. In meaningful learning, often associated with deep learning, knowledge is achieved through the linking of new concepts with prior knowledge and the establishment of relationships between concepts, while in superficial learning, content is solely stored, and no connection is established between concepts (17). Different studies in the field of nursing have concluded that deep and meaningful learning leads to high levels of thinking about nursing knowledge and clinical skills of patient care (14, 18). One of the indicators of meaningful learning is the learning approaches adopted by learners (17, 19).

Biggs et al., for the first time, defined learning approaches as a way of performing academic assignments that influence the nature of learning outcomes. They described the learning process as a predictive process model. There are predisposing factors before the learning situation, which are indicative of individual factors such as personality, attitude, prior knowledge, and preferential learning styles as well as situational factors such as the context of education, including content, teaching methods and processes, and institutional assessment (20). Most studies on learning approaches are derived from the study by Marton and Säljö (21). They found that some learners have intrinsic motivation and try to understand the meaning of the content being studied and link it to their schemata and called it deep approach (21). In a superficial approach, learners mostly tend to have a superficial learning style and only attempt to memorize the materials they think they would need in evaluations (4, 22). Subsequent studies showed that the deep learning approach compared to the superficial approach leads to the promotion of academic success and is an important factor in the quality of learning (23).

## 2. Objectives

Considering that the dominant teaching methods in medical sciences are traditional methods that preclude the integration of newly acquired materials with basic knowledge and their application and given the importance of enhancing deep learning in medical sciences education using learner-centered approaches, we sought to investigate

the effect of the flipped classroom teaching method on nursing students' learning approaches.

## 3. Methods

This was a one-group semi-experimental study with a pretest-posttest design. All the 49 undergraduate nursing students who had completed the orthopedic nursing unit in the academic year of 2017 - 2018 were invited to participate in the study. The participants were chosen through the census method. The students were ensured of the voluntary nature of participation in the study. Also, they were informed of their rights as participants in the study. Those who were willing to participate completed the informed consent form. The present study was approved by the Ethics Committee of Islamic Azad University of Rasht (code: IR.IAU.RASHT.REC.1395.8).

The inclusion criteria included completion of the theoretical unit of orthopedic nursing, access to a computer, and willingness to participate in the study. Absence of more than one session from the class, lack of willingness to continue cooperation, and incomplete completion of the questionnaire were considered as the exclusion criteria. Of the 49 distributed questionnaires, three were incomplete; thus, 46 were analyzed.

To implement the flipped classroom method, the instructor recorded all the orthopedic nursing lesson lectures in the traditional classroom method before the outset of the course. Then, an expert in e-learning, using the Articulate Storyline software and slides and videos provided by the instructor, prepared electronic content for seven sessions. The entire electronic content was copied to a compact disc and distributed among the students a week before the classes began.

Based on the lesson plan, students knew what content and what pages of the reference book should be studied before each session. In this way, the students attended each session with prior preparedness. In each session, the instructor first gave a brief lecture on the learning objectives of the session, and then the students responded to quiz questions. The teacher then divided the students into small groups of 3 - 4. The learners' activities in small groups included discussion and comparison, answers to quiz questions, and clinical scenarios. Before each session, the lecturer, in accordance with the concepts of each session, designed clinical scenarios with the aim of applying theoretical knowledge in clinical situations, and the students were asked, after thinking and sharing in the group, to answer the clinical scenario questions and then have a discussion with the professor and other students. The course lasted for eight weeks.

A two-part questionnaire was used to collect data. The first section included demographic information such as age, gender, marital status and employment status, and personal data included grade point average, and orthopedic nursing course grade point. The second section was the Revised Two-Factor Study Process Questionnaire (R-SPQ-2F) that was used to evaluate students' learning approaches (20). The questionnaire was based on the studies by Mar-ton and Säljö (21) and Biggs (24).

R-SPQ-2F consists of 20 items and two sub-scales of deep approach and superficial approach, each of which comprises 10 items rated based on a five-point Likert scale (i.e., never applies to me = 1 to it is always the case for me = 5). The sub-scale scores are summed up separately and the minimum and maximum scores of each approach are considered to be 10 and 50, respectively. Each of the superficial and deep approaches consists of two subscales of motive and strategy. Biggs et al. established the reliability of this tool using the Cronbach's alpha coefficient for the deep approach (alpha: 0.73) and the superficial approach (alpha: 0.64) (20). The scale has been used in various international studies to evaluate meaningful learning and learning approaches in nursing students (4, 25, 26).

The R-SPQ-2F questionnaire was previously translated into Persian (27). Prior to the study, Cronbach's alpha coefficient was used to calculate the reliability of the instrument. The questionnaire was filled out by 30 nursing students of Islamic Azad University of Rasht who were randomly selected. The reliability of the tool in the sub-scale of the superficial approach was 0.75, and in the sub-scale of deep approach it was 0.64. To collect the data in the first session and at the end of the final session, samples were asked to write a four-digit code based on the day and month of their birth on their questionnaires and then complete the questionnaires based on their study approach.

To investigate the distribution of research variables, Kolmogorov-Smirnov test was used, which indicated the normal distribution of the variables and therefore, parametric statistics were used for analysis. Frequency, percentage, mean and standard deviation were applied for analyzing demographic information and learning approaches. Paired *t* test was run to investigate the effect of the flipped classroom method on learning approaches, Pearson correlation coefficient to examine the relationship between deep and superficial learning, and independent *t* test to investigate the relationship demographic variables and students' learning approaches. Finally, the data were analyzed using SPSS version 20 (version 20, IBM Corporation, Armonk, NY).

#### 4. Results

Of the 49 students, 46 completed the questionnaire before and after implementing the flipped classroom method. Three students were excluded from the study due to incomplete questionnaires. Thus, the response rate was 96.5%. Of the 46 participants, 69.6% were female, 89.1% were within the age group of 18 - 22 years, 93.5% were single, and 87.0% were not employed. The mean grade point average (GPA) of the previous semester and the mean orthopedic nursing grade point of the samples were  $15.27 \pm 1.31$  and  $15.45 \pm 14.2$ , respectively.

Paired *t* test was used to examine the effect of flipped classroom method on students' learning approaches (Table 1). The results of the data analysis showed that the flipped classroom method significantly increased the deep learning approach ( $P < 0.001$ ) and its subscales including deep motive ( $P < 0.001$ ) and deep strategy ( $P = 0.001$ ). Although the scores of superficial learning and the subscales of superficial motive and superficial strategy increased, this difference was not statistically significant. To investigate the relationship between deep learning and superficial learning, Pearson correlation coefficient was used. According to this, there was a significant negative correlation between the two variables before ( $r = -0.29$ ,  $P = 0.047$ ) and after ( $r = -0.34$ ,  $P = 0.015$ ) the implementation of the flipped classroom method.

**Table 1.** Comparison of Nursing Students' Learning Approaches Before and After Implementing the Flipped Classroom Method<sup>a</sup>

Learning Approach	Before	After	P Value
Deep motive	15.13 ± 3.28	18.22 ± 2.92	< 0.001
Deep strategy	13.83 ± 3.22	15.96 ± 2.89	0.001
Superficial motive	11.02 ± 3.22	11.04 ± 4.52	0.977
Superficial strategy	12.24 ± 3.52	12.93 ± 3.82	0.289
Deep approach	28.96 ± 5.70	34.17 ± 4.90	< 0.001
Superficial approach	23.26 ± 5.99	23.98 ± 7.46	0.564

<sup>a</sup> Values are expressed as mean ± SD.

The previous semester GPA and the orthopedic course grade point showed a significant relationship with the learning approach. Based on Table 2, the previous semester GPA of the students who had a deep learning approach had a significant positive correlation with the learning approach before and after the implementation of the flipped classroom method, that is, students who had a higher GPA used the deep learning approach both before and after the implementation of the flipped classroom method. In addition, the orthopedic nursing grade point was poorly associated with the deep learning approach after the implementation of the flipped classroom method.

**Table 2.** Relationship Between Nursing Students' Learning Approaches Before and After Implementing the Flipped Classroom Method with the Previous Semester Grade Point Average and Orthopedic Nursing Course Grade Point

Learning Approach	Before		After	
	Correlation Coefficient	P Value	Correlation Coefficient	P Value
<b>Deep approach</b>				
Previous semester GPA <sup>a</sup>	0.504	< 0.001	0.300	0.042
Orthopedic nursing GP <sup>b</sup>	0.208	0.166	0.369	0.012
<b>Superficial approach</b>				
Previous semester GPA	0.037	0.809	0.128	0.397
Orthopedic nursing GP	0.046	0.762	0.258	0.084

<sup>a</sup> GPA: Grade point average<sup>b</sup> GP: Orthopedic nursing grade point

## 5. Discussion

The purpose of this study was to investigate the effect of flipped classroom method on nursing students' learning approaches. The results showed that the flipped classroom method significantly increased the deep approach and its subscales, including deep motive and deep strategy, while not affecting the superficial approach and its sub-scales. In this regard, McLaughlin et al., who used the flipped classroom approach among pharmacology students in their research, found that flipped classroom could promote classroom attendance and learning. They concluded that meaningful learning is a shared responsibility of the instructor and learner and can be boosted through learner-centered methods such as flipped classroom (28).

Hanson also used the flipped classroom method to teach nursing students pharmacology lessons and concluded that students who had viewed recorded lectures before attending the class had a better perception of the teaching concepts (13). Also, Raihanah studied the impact of the flipped classroom teaching method on literature students' learning and found that flipped classroom leads to higher learner ability and flexibility in learning participation (29). This finding could be manifold. The flipped classroom method with emphasis on active learning and learner-centeredness (30) and the use of class time on the application of the learned concepts allows for deep learning (31). In this approach, the learner is expected to prepare a great volume of assignments before attending the classroom in order to achieve the desired learning outcomes; in many studies, the compulsion to study lengthy electronic contents and reference books caused students' dissatisfaction (10, 32). It has been shown that heavy academic workload and tasks affect the depth of students' studies, and this suggests that the prerequisite for optimal studying and learning is reasonable amount of assignments and that too few tasks and assignments do not affect students'

learning (26).

One of the reasons why students use the superficial approach and try to memorize content without deep learning is that they study according to the needs of the course. If students perceive that the lesson requires superficial studies, they will adopt a superficial approach, while if the lesson's assignments require deep learning, they will engage in complex cognitive activities and relate concepts to their prior knowledge (33), as the flipped classroom teaching method in this unit, which helped deepen the learning of learners. The results of this study showed that the flipped classroom method does not affect superficial learning. The superficial learning approach is considered as an unsuccessful approach in higher education, since the learner only tries to memorize information to pass the final exam, while the newly learned materials are not connected to the previous ones (4).

The result of Pearson correlation test reflected a significant negative correlation between deep learning and superficial learning before and after implementing the flipped classroom method. Henoeh et al. also used the R-SPO-2F questionnaire among nursing students and reported a weak significant negative correlation between deep and superficial learning (25). Gurcay also found a significant negative correlation between deep learning and superficial learning (17). In interpreting this finding, it can be noted that with the increasing desire of nursing students to learn by linking concepts with prior knowledge, their tendency toward superficial learning, that is memorizing and storing concepts without making any connections, will be reduced (31).

Based on the results of this study, students with a higher GPA in the previous semester used a deep learning approach both before and after the implementation of the flipped classroom method. In addition, there was a significant correlation between orthopedic nursing grade point

and the deep learning approach after the flipped classroom method was implemented. In the study by Rosander and Bäckström, there was also a weak positive correlation between deep learning and the mean academic scores of students (34). In a prospective study among nursing students, Salamonson et al. found that deep learning predicts students' scores in the university, and such students use adaptive skills as self-regulation strategies in learning (35). In other words, deep learning is associated with better student scores and academic success.

### 5.1. Conclusions

The results of this study showed that by implementing the flipped classroom teaching method the deep learning approach is boosted among nursing students. Also, students who studied with a deep approach had better academic outcomes. Hence, the flipped classroom method can be used to promote learning among medical sciences students. This educational method has the potential of equipping learners to work in complex therapeutic environments. This quasi-experimental study was performed in the absence of a control group; thus, we suggest further evaluations of the effects of the flipped classroom method on learning approaches of students using experimental studies with a control group. By assessing the learning approaches of students, it is possible to identify new educational methods that are effective in deep learning.

### Supplementary Material

Supplementary material(s) is available [here](#) [To read supplementary materials, please refer to the journal website and open PDF/HTML].

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### Footnotes

**Conflict of Interests:** There is no conflict of interests.

**Ethical Considerations:** The students were ensured of the voluntary nature of participation in the study. Also, they were informed of their rights as participants in the study. Those who were willing to participate completed the informed consent form. The present study was approved by the Ethics Committee of Islamic Azad University of Rasht (code: IR.IAU.RASHT.REC.1395.8).

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