

## Effect of Flipped learning on the Higher-order Thinking Skills and Engagement among Nursing Students

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**Abstract:** Owing to the current challenges with the traditional learning methods, nursing student require innovative learning platforms. Flipping learning may offer effective learning platform. The design of this study was quasi experimental design. It was conducted at the pediatric nursing department, faculty of nursing in Menoufia University. For data collection, a simple random sample of 110 students was participated. Instruments of this study were Higher-order thinking skills structured questionnaire, Student engagement questionnaire and Student's Satisfaction scale. The results of this study showed that the utilization of flipping learning method significantly improved students' higher-order thinking skills and engagement on post-test ( $20.28 \pm 1.33$  and  $10.15 \pm 2.64$  respectively). Also, it increased students' level of satisfaction on posttest (63.63% of students were very satisfied). Therefore, this study recommended that the flipping learning method should be integrated into the critical care and emergency of the pediatric nursing course and general pediatric nursing course. An ongoing in-service education program about flipping learning method of teaching should be designed and implemented at the pediatric nursing department for faculty staff members.

**Keywords:** flipping learning, Higher-order thinking skills, engagement

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### I. Introduction

Traditional learning is nearly teacher-centered which struggle with the constructivist methods of teaching [1]. Many problems appear speedy with traditional lectures especially in higher education. For example, the information presented in class may be known for some students. Others may have problem in understanding information so rapidly, or they may have shortage to the previous knowledge needed for understanding the concepts presented [2]. Traditionally, teaching in classes is teacher predominant. As, teachers spend class time in introducing basic concepts, asking students to read, explaining ideas, giving boring lectures and so on [3].

Today's students are faced with intensive cognitive challenges. Students are in need to be prepared to solve problems, predict outcomes, and deal with novel clinical scenarios to cope with Bloom's cognitive domain. Moreover, students are in intense need for developing higher order thinking skills (HOTS) [4]. Various definitions were used by many researchers to define higher order thinking skills. According to [5] they mentioned that HOTS is a cognitive process that involves analyzing, evaluating, and creating in the cognitive domain. Therefore, teaching methods must be adapted to prepare students effectively.

Many teaching modalities are used to enhance student learning. One of the most recent drives is for nursing students to become active participants in their learning and become lifelong learners through applying flipped learning technique. This drive is supported by the Institute of Medicine's (IOM, 2010) Future of nursing report and restated in IOM's 2015 progress report [6]. The flipped classroom is an instructional strategy that provides a new pedagogical method and modality for education process. It has many advantages for lecturers. It decreases the amount of direct instruction in their teaching practice, increases active interaction and more cooperative and collaborative contribution to the teaching process. Also, it can improve and encourage social interaction, teamwork and cultural diversity among students [7].

Also, flipped learning help to create and offer an active and collaborative learning environment. Besides, students assimilate knowledge through application, evaluation, more conducive in facilitating deeper approaches to learning through encouraging higher order critical thinking and creativity [8-10]. Experiments of Flipped classroom pedagogy presented a good priority to observe the students how well they managed with given tasks, or if they needed more exercise with certain topics. It also allowed more possibilities for one to one attention with those students who seemed to need help, encouragement or positive feedback to be able to continue with difficult and demanding topics [11].

These changes affect student's engagement and satisfaction. Engagement is an important axis in the learning process. Satisfaction is a significant psychological factor in academic success [12]. Student engagement

and satisfaction is a predictor of student learning and achievement, retention and graduation from high school, and entry into and success in college [13]. So, the aim of this study is to determine the effect of flipped learning on student's engagement and satisfaction in Pediatric Nursing.

### **The Purpose of the Study**

This study aimed to determine the effect of flipped learning on higher-order thinking skills and engagement among nursing students.

### **Hypothesis**

Nursing students who would receive flipped learning instruction would exhibit higher levels of higher-order thinking skills and engagement than students who would receive traditional learning methods.

## **II. Subjects and Methods**

### **1.1. Research Design**

The researchers utilized a quasi-experimental design to conduct this study.

### **2.2. Research Setting**

This study was conducted at the pediatric nursing department, faculty of nursing, Menoufia University at Shebin El-Kom city.

### **2.3. Participants:**

A simple random sample of 110 students was utilized. At a 0.95 level of confidence, 80% power test and an accepted margin of error 5%, the sample size ( $n$ ) was estimated based on the following formula:

$$n = \frac{N \times p(1 - p)}{[N - 1 \times (d^2 \div z^2)] + p(1 - p)}$$

In which,  $N$  is the population;  $z$  is the level of confidence,  $d$  is the margin of error and  $p$  is the proportion of subjects. The estimated sample size was 147 students. The researcher reported the frequent absenteeism for 37 students therefore, they discontinued their enrollment.

The participants enrolled in the pediatric nursing course during the academic year of 2017-2018. The researchers assigned them randomly into experimental and control groups. The experimental group received the instructions of flipped learning method. Meanwhile, students in the control group received the instructions of traditional learning methods.

### **2.4. Instruments**

The researchers utilized and developed three instruments for data collection.

**Instrument one:** Higher-order thinking skills structured questionnaire. It developed by the researchers to assess student's higher order thinking skills. This tool was divided into two parts.

**Part one:** Socio-demographic characteristics of the student to obtain data such as students' age, sex.

**Part two:** Higher-order thinking skills questionnaire. It included 30 questions divided into three levels based on Bloom's Taxonomy. It was analyzing (15 questions), evaluating (10 questions) and creating (5 questions). These questions were multiple choice and open-ended questions. Each question scored as one grade for a correct answer and zero for the wrong answer with a total score of 30 points. The reliability of the tool was confirmed by Cronbach's Alpha test  $r = 0.82$ .

**Instrument Two:** Student engagement questionnaire. A five-point likert scale to determine student engagement. It developed by [14]. It included 19 items ranged from strongly agree to strongly disagree. The total score was 95 points. The reliability of the tool was reported by Cronbach's Alpha test  $r = 0.84$ .

**Instrument Three:** Student's Satisfaction scale. It was adopted from [15] and modified by the researcher. It is a five-point Likert scale included 16 statements. Its' responses ranged from strongly disagree (0) to strongly agree (5). The total score was 80, students considered unsatisfied if their score  $< 48$ , somewhat satisfied if the scores were 48-56 and very satisfied if it were  $> 56$ . Reliability of the questionnaire was confirmed by Cronbach's Alpha test  $r = 0.81$ .

## **2.5. Validity and Reliability:**

Tools were developed by the researcher for data collection after a review of past and current literature, local and international related literature using books, articles, periodicals, and magazines. Then, the tools were submitted to a jury of three pediatric nursing experts for the validity purpose. Tools reliability was tested by Cronbach's co-efficiency alpha.

## **2.6. Ethical Consideration:**

For the protection of human rights, the researchers obtained an informed consent from the third year pediatric nursing students after a clear explanation of the objectives of the study, its importance, safety and confidentiality for the participants.

## **2.7. Pilot study:**

A pilot study was carried out on 10 students to test the practicability, applicability, and feasibility of items in data collection tools. No modifications were done. The sample of the pilot study was excluded from the total sample.

## **2.8. Procedure:-**

- 1- Prior to data collection, a written permission to carry out the study was obtained from the dean of the Faculty of Nursing at Menoufia University explaining the purpose of the study and methods of data collection.
- 2- Data collection for this study was conducted in the second semester during the academic year of 2017-2018 for a period of three weeks.
- 3- The researcher followed three phases model for conducting the current study.

### **3.1 Preparatory phase**

- i. The researchers randomly selected the units of the critical care and emergency of the pediatric nursing course to be flipped which were renal failures, fluid and electrolytes imbalance, and hepatic failure. The contents of each unit would cover the basic theoretical and practical issues. The researchers determined the learning outcomes of the lessons which were divided into lower-order thinking skills (remembering, understanding and applying) and higher-order thinking skills (analyzing, evaluating and creating). It was guided by Blooms' Taxonomy.
- ii. The researcher assigned students randomly into experimental and control groups equally. Control group taught the pre-determined units of critical care and emergency of pediatric nursing through traditional teaching methods such as lecture.

### **3.2 Performance phase**

- iii. The researcher explained the purpose of the study, its benefits and the requirements to the students.
- iv. The experimental group taught the pre-determined units of critical care and emergency of pediatric nursing through a flipped classroom teaching method
- v. In the beginning, the researcher applied tool one to assess student's higher order thinking skills of the experimental and control groups. The researcher categorized the learning activities into pre-class preparation and in-class activities.

#### **3.2. A. Pre-class preparation:**

- vi. Prior to the class at least 7 days, the researcher provided a lesson map the students included the flipped topics, learning outcomes and pre-class learning activities (assignments, textbook readings, YouTube videos, and power point presentation).
- vii. Students were responsible for reviewing all the assigned resources.
- viii. The researchers expected that students would gain sufficient knowledge that enabled them to practice various critical thinking skills during in-class activities. Upon completion of the pre-class activities, students should write questions on the pre-determined topic.

#### **3.2. B. In-class activities**

- i. The researcher began the flipped session by discussing students' questions for 10 minutes.
- ii. The researcher asked students to write the key points of the topic to be flipped, the new theoretical or practical knowledge they attained from their readings.
- iii. The researcher divided students into 4 groups then she assigned the case studies for each group. The researcher allowed 10 minutes to review and answer the questions within each case study.
- iv. The 4 groups allowed to present their case studies and ask questions (10 minutes) therefore, groups' discussion began for another 10 minutes. The researcher role was limited to coaching the flipped learning session.

- v. The researcher utilized collaborative learning techniques through think-pair-share and group discussion learning activities.
- vi. Finally, the researcher provided a correct feedback to students and summarized the main key points of the topic.

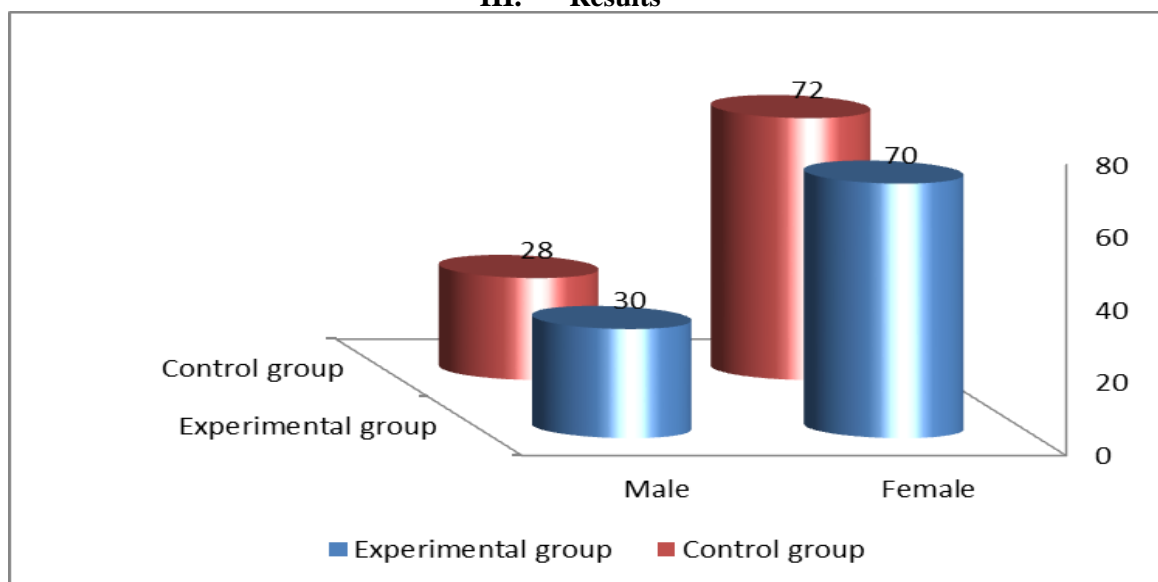
**3.3. Evaluation Phase:**

- i. At the end of each classroom, the researcher examined the students' higher-order thinking skills by instrument number one.
- ii. At the end of the 3rd week, the researcher distributed the student engagement questionnaire and satisfaction questionnaire to assess a student's engagement and satisfaction.

**2.9. Statistical Analysis:**

The collected data were categorized, tabulated, and summarized. Data were computerized and analyzed by SPSS version 20 (SPSS Inc., Chicago, IL, USA). Two types of statistics were done descriptive and analytical to examine the research hypothesis. Descriptive statistics were done using percentage (%), mean and standard deviation (SD). Analytical statistics used in the study were Chi-Squared ( $\chi^2$ ), Paired t-test. Statistically significant difference was found if  $P < 0.05$ .

**III. Results**



**Figure (1): Students' distribution regarding their gender.**

Figure 1 shows the students' distribution regarding their gender. As indicated in the figure, nearly the majority of students in experimental and control groups were female (70% and 72% respectively).

**Table (1): Mean grades of higher-order-thinking skills among experimental and control groups on pre-test.**

Higher-order thinking skills	Experimental (n=55) Mean ± SD	Control (n=55) Mean ± SD	t-test	P
Analysis	6.21±0.43	5.94±0.75	1.30	0.35 <sup>ns</sup>
Evaluation	3.95±0.12	3.81±0.30	1.13	0.24 <sup>ns</sup>
Creating	2.00±0.54	1.98±0.71	0.094	0.98 <sup>ns</sup>
Total	12.14±1.65	11.73±1.43	0.17	0.77 <sup>ns</sup>

<sup>ns</sup> non-significant

Table 1 shows the mean grades of higher-order thinking skills among experimental and control groups on the pre-test. Mean students' grades in the experimental group were 6.21±0.43, 3.95±0.12, 2.00±0.54 and 12.14±1.65 compared to 5.94±0.75, 3.81±0.30, 1.98±0.71 and 11.73±1.43 in control group respectively. There were no statistically significant differences between students at 0.05% level of statistical significance.

**Table (2) Mean grades of higher-order-thinking skills among experimental and control groups on post-test.**

Higher-order thinking skills	Experimental (n=55) Mean ± SD	Control (n=55) Mean ± SD	t-test
Analysis	10.15±2.64	6.01±0.08	13.16**
Evaluation	16.73±3.04	4.02±2.03	6.31**
Creating	3.41±1.80	2.16±1.65	3.53**
Total	20.28±1.33	12.18±2.37	22.08**

\*\* P< 0.001

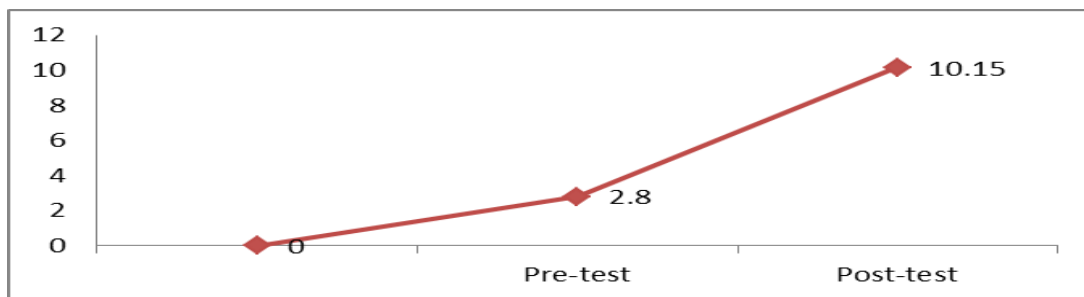
Table 2 shows the mean grades of higher-order-thinking skills among experimental and control groups on post-test. It clarified that on the post-test examination, the mean grades of students within the experimental group was higher than their peers within the control group. It was 10.15±2.64, 16.73±3.04, 3.41±1.80 and 20.28±1.33 compared to 6.01±0.08, 4.02±2.03, 2.16±1.65 and 12.18±2.37 in control group respectively. There were obvious highly statistically significant differences between student's grades in the experimental and control groups on post-test at 0.001% level of statistical significance.

**Table (3): Mean grades of higher-order-thinking skills among the experimental group on pre and post-tests.**

Higher-order thinking skills	Experimental (n=55) Mean ± SD		t-test
	Pre-test	Post-test	
Analysis	6.21±0.43	10.15±2.64	8.99**
Evaluation	3.95±0.12	16.73±3.04	8.20**
Creating	2.00±0.54	3.41±1.80	4.83**
Total	12.14±1.65	20.28±1.33	24.73**

\*\* P< 0.001

Table 3 shows the mean grades of higher-order-thinking skills in the experimental group on pre and post-tests. The mean students' grades on the pretest were 6.21±0.43, 3.95±0.12, 2.00±0.54 and 12.14±1.65 compared to 10.15±2.64, 16.73±3.04, 3.41±1.80 and 20.28±1.33 on posttest respectively. There were obvious highly statistical significant differences between students' grades at 0.001% level of statistical significance.



**Figure 2: Mean scores of engagement among the experimental group on pre and post-test.**

Figure 2 show mean scores of engagement among experimental group on pre and post-test. It was 2.80±0.46 on pretest compared to 10.15±2.64 on posttest. There were highly statistically significant differences between students' scores of engagement at 0.001% level of statistical significance

**Table (4): Distribution of students' satisfaction level among experimental group on post-test phase.**

Satisfaction level	Experimental group (n=55)				Chi-square
	Pre-test		Post-test		
	No	%	No	%	
Unsatisfied	40	72.72	5	9.09	11.79**
Somewhat satisfied	20	36.36	15	27.27	
Very satisfied	0	0	35	63.63	

\*\*P <0.001

Table 4 shows the distribution of students' satisfaction level among experimental group on post-test phase. It demonstrated that nearly the majority of students (72.72%) on pretest were unsatisfied meanwhile, on

posttest they were very satisfied (63.63%). There were highly statistically significant differences between students' satisfaction level at 0.001% level of statistical significance.

#### **IV. Discussion**

Fostering students' higher-order-thinking skills is considered an important educational goal. The new approach of learning focused on students' abilities and interests. They are responsible for the learning activities outside the learning environment. It relies on more attractive learning resources that may include videos, audios, online readings and learning websites. Creative teachers should employ their skills to design an interactive environment that requires an interactive and collaborative work of students. They should work in pairs or groups. Teachers should prepare hands-on activities [16].

Higher-order-thinking skills facilitates the acquisition of knowledge and assists its transformation into responsible actions regardless of students' future role in society [17]. Students would have to practice critical thinking for the analysis of unfamiliar situations. Therefore, their problem-solving skills, asking-questions abilities, and decision-making skills will be framed by rational thinking [17-19].

This study aimed to determine the effect of flipped learning on higher-order thinking skills and engagement among nursing students. In relation to higher-order thinking skills, there was no significant difference between experimental and control groups at pre-test. These results were supported by [15] who conducted a study about "An EFL Flipped Classroom Teaching Model: Effects on English Language Higher-order Thinking Skills, Student Engagement and Satisfaction". This inferred to the urgent need for adopting a new and innovative teaching strategy to ensure the preparation of professional nurses for practicing and attaining higher-order thinking skills.

Regarding higher-order thinking skills among experimental and control groups at post-test phase. The results represented a significant difference between experimental and control groups at post-test. This result was supported by [20] who conducted a study about "Use of the flipped classroom instructional model in higher education: instructors' perspectives" illustrated that in-class practice led students' learning into a more positive interactive and more in-depth way, and improved students' higher-order thinking skills.

In addition, these results were also supported by [15]. These findings confirmed the effectiveness of the flipped classroom learning technique in students' learning. Students directed to gain an idea on a specific topic before attending the classroom. In addition, they should have enough time to attain the basic levels of thinking skills by themselves. They should write notes, questions, and comments on the predetermined content. Inside the classroom, they participated in a positive interactive environment. The instructors provided the chance for meeting the higher-order-thinking skills and promoting student-centered learning using think-pair-share, group discussion, case studies and problem-solving skills.

Regarding higher-order thinking skills among students of the experimental group on pre and post-tests, the present study showed that there was a significant difference between the experimental group at pre and post-test phase. This result confirmed by [21] who studied "Successful EFL teaching using mobile technologies in a flipped classroom". Also, this study was confirmed by [7] who studied "Effectiveness of flipped classrooms in nursing education: Systematic review and meta-analysis". They found that flipped learning was effective in nursing education. This finding might be due to shifting from teacher-centered learning to student-centered learning. The students were interactive, assimilated knowledge through application and evaluation and used deeper approaches in learning that enhanced critical thinking and creativity [10].

Additionally, flipped classroom gave the opportunity to observe the students how well they managed with given tasks and provided positive feedback to be able to continue with difficult and demanding topics. Students practiced the skills more successfully and efficiently. They had the opportunity to communicate and discuss with instructors more deeply about the content [22].

In relation to students' engagement for experimental group at pre and post-test, there was a highly statistically significant difference between pre and post-tests. This result was consistent with [23] who studied "Changing Paradigms: A Mixed Methods Study of Flipping the English Language Arts Classroom". He reported increased engagement of students during the application of the flipped classroom method than the traditional teaching methods.

In addition, these results were also supported by [24] that studied "Affordances of flipped learning and its effects on student engagement and achievement". He revealed that students were interacting physically and cognitively with the content. This could be attributed to the advantages of flipped learning that provides great opportunity for improving communication, motivating students for self-learning and encouraging them to attain sufficient knowledge. In addition, non-traditional activities being implemented allow students to control their learning that promotes the student-centered learning [25].

Concerning students' satisfaction level between the experimental group on pre and post-tests, the result revealed that there was a highly significant difference between the experimental group on pre and post-tests. This result was agreed with [26] who studied " Flipped Learning, Flipped Satisfaction, Getting the Balance

Right". They mentioned that all research participants' preferred flipped classroom approach and the use of online modules than the traditional face-to-face approach for tutorials.

The findings of studies confirmed the importance of adopting flipped learning in teaching strategies. Students' satisfaction is a very important element in the learning process. Furthermore, successful learning basically meant by satisfied students. Students are psychologically and physically well prepared for practicing interactive learning. It supports the students to participate, engage and constitute a deep meaning of learning [27].

## V. Conclusion

Based on the finding of the present study and the research hypotheses, it concluded that utilization of the flipping learning method improved the students' higher-order thinking skills and engagement on post-test than pretest. Also, it increased students' level of satisfaction regarding the learning process of flipping learning than traditional learning.

## Recommendations

Based on the findings of the present study, the following recommendations are suggested:

1. Flipping learning method of teaching should be integrated into the critical care and emergency of the pediatric nursing course and general pediatric nursing course.
2. Design a flipping learning booklet that will include various flipping learning activities (pre-class learning activities, in-class learning activities) for each unit of the courses.

Ongoing in-service education programs about flipping learning method of teaching should be designed and implemented at the pediatric nursing department for faculty staff members.

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