The Effect of Flipped Class Strategy on Pediatric Nursing Students' Critical Thinking Skills

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ABSTRACT

Background: The flipped class strategy is one of the popular teaching approaches in recent years and it has widely been used in nursing education. **Aim of the study**: this study aimed to evaluate the effect of flipped class strategy on pediatric nursing students' critical thinking skills. **Research design:** A quasi-experimental design was used. **Study setting:** the study was conducted at Embaba Technical Health Institute that affiliated to Ministry of Health. **Subjects:** The subjects included the second-year students (n=180) enrolled in pediatric nursing course, during academic year 2022-2023. **Tool of data collection:** Critical Thinking Skills questionnaire sheet, it was designed by the researcher in the light of related references. **The results:** Revealed that, there was statistically significant difference between flipped class strategy knowledge of the study group pre and post intervention and. There was statistically significant difference between the critical thinking skills level of the study group pre and post intervention. In addition, there was statistically significant difference between the students' total knowledge regarding Flipped class and their total critical thinking skills level in the study group post intervention. **In conclusion:** nursing students who exposed to the intervention of flipped class strategy exhibited an improvement in the critical thinking skills in pediatric nursing course. **The study recommended:** Integrate flipped class strategy as a method of teaching in pediatric nursing course and other nursing courses and provide training course for nursing students about flipped class strategy.

Key-Words: Flipped class, Critical thinking, Pediatric nursing.

INTRODUCTION

The primary objective of nursing education is to cultivate proficient nurses capable of delivering high-quality care within the dynamic landscape of nursing practice. Consequently, students **specializing** in pediatric nursing must acquire the essential knowledge, skills, and attitudes required to address the challenges that emerge in various contexts during their training **(Lee, 2018).**

During the nursing education process, it is anticipated that students will develop skills in problem-solving, analytical, reasoning, critical thinking, writing, communication, interpersonal relations, teamwork, ethical decision-making, and proficiency in information and communication technologies (Kim, 2024). So, the scope of nurses' education should be as good as thinking, problematic, and clinical reasoning to have the professional skills necessary for high-quality and effective care (**Torabizadeh et al., 2019**), to enhance critical thinking skills that nursing undergraduates need to acquire or develop in the education process to become nurses who provide safe and competent nursing care. Clinical decision- making and critical thinking must be addressed together so that students can know how to think like nurses and make clinical decisions about patient care **(İlaslan et al., 2023).**

Critical thinking skills are a fundamental element of nursing education. Critical thinking in nursing; it is a thinking process that includes features such as collecting and organizing the data obtained from the patient/healthy individual, deciding on the needs in parallel with these data, choosing one of the possible approaches based on knowledge and developed with applications, and evaluating the results of the procedure (**Günerigök et al., 2020)**

Teaching students critical thinking is a basic characteristic of higher education while the skill has a range of impacts on graduates' academic, professional and personal capacities. As students become critical thinkers, they are better prepared to develop a successful professional nurses' characteristic **(Ismail, 2023).**

To effectively teach and train entry-level nursing professionals, nurse educators must be open to novel and unconventional methods. They must also find ways to give their students more opportunities for creativity, problem-solving, critical thinking, and active participation **(Innis et al., 2023).**

The flipped class strategy is one of the popular teaching approaches in recent years and it has widely been used in nursing education **(Lo & Hew, 2021).** Flipped learning is a pedagogical approach that involves a reversal of the traditional classroom structure In this model, students are responsible for their own learning and engage with instructional content before the in-person class session, allowing the in-class time to be dedicated to interactive activities, collaborative discussions, and problem-solving **(Barranquero-Herbosa .,et al 2022)**

Flipped class approach aims to enhance student engagement, critical thinking, and self-directed learning by shifting the role of educators from direct content delivery to facilitating deeper understanding through active learning experiences (Fan et al., 2020). The use of the flipped class approach can generally increase student engagement, such as attention and course satisfaction. Therefore,

the use of this instructional approach is widespread in education (**Galindo-Dominguez, 2021)**

Significance of the study:

Nursing education encounters many challenges and continuously attempt to improve teaching and learning strategies in theory and practice. Due to rapid changes of science, meaningful learning are becoming more important for nursing students who will need to keep abreast of these changes that relate to the practice of nursing. Thus, to remain professionally, competent, nursing students who are the future nurses needs to be critical thinkers, problem solvers and lifelong meaningful learner. Use of flipped class strategy in the educational process improves students' critical thinking and meaningful learning activities. Furthermore, concept mapping enables the students to evaluate what have learned and what need to learn.

Also, teaching pediatric nursing students using the traditional methods is no longer a target for achieving learning competencies or maximizing cognitive abilities. The overall nursing education is extremely directed into advanced teaching methods such as flipped class strategy. So from the researcher point of view, it's important to evaluate the effect of flipped class on pediatric nursing students' critical thinking at the Technical Health Institute of Embaba.

AIM OF THE STUDY

The study aimed to evaluate the effect of flipped class strategy on pediatric nursing students' critical thinking skills through:

1. Assessing nursing students' critical thinking skills.
2. Designing and applying flipped class strategy in pediatric nursing course.
3. Evaluating the effect of flipped class strategy on pediatric nursing students' critical thinking skills.

Research hypotheses

Pediatric nursing students who will be exposed to the intervention of flipped class strategy will exhibit an improvement in the critical thinking skills in pediatric nursing course.

SUBJECTS AND METHODS

I- Technical design: Research Design:

A quasi- experimental design was used to conduct the study.

Settings:

The present study was conducted at Embaba Technical Health Institute that affiliated to Ministry of Health (MOH). Nursing is one department of 8 departments in the institute. The student is enrolled in the institute from a general

secondary school, except in nursing department, the students are enrolled either from general secondary school or nursing schools.

Sampling:

A Convenient sample was included in the study. Their number was 200 of the 2nd year students enrolled in, during the academic year 2022-2023. The students were divided randomly into two groups: Where the first group (control group) included 90 students; were subjected to traditional nursing.

The second group (study group) included 90 students; were subjected to flipped class strategy.

Inclusion criteria:

Only students who were enrolled in the Pediatric Nursing course for the first time was included in the study.

Exclusion criteria:

Students who were repeating the second year (Pediatric Nursing course) because they had previous knowledge which may affect the result of the study.

Data Collection Tool:

The data was collected through the following tools:

After reviewing the relevant literature, the following tool was used for data collection:

Critical Thinking Skills questionnaire sheet, it was designed by the researcher in the light of related references and was divided into three parts:

Part 1: This part was intended to collect data related to characteristics of the pediatric nursing students (such as: age, residence, previous academic year grade).

Part 2: This part was intended to assess critical thinking skills among pediatric nursing students (namely: analysis, reasoning, problem solving, decision making and evaluation skills).

- ***Scoring system:***

Each item had 3 responses where, agree (3), uncertain (2) and disagree (1).

Critical thinking skill	Number of items
Analysis skills	(12 items)
Reasoning skills	(17 items)
Problem solving skills	(17 items)
Decision making skills	(10 items)
Evaluation skills	(12 items)

The total score:

Score < 60% was referred to poor level, score from 60 - 75 was referred to average level and score from 75 ≤ 100 was referred to good level.

Part 3: This part was intended to assess the knowledge of pediatric nursing students regarding to flipped class strategy.

It was scored as: (One mark) for correct answer to each question and (zero) for each incorrect answer. Accordingly, the student's total knowledge level was considered poor if the total score was less than 60%, average for score ranged from 60% to less than 75% and good for 75% or more.

Operational Design

Preparatory phase:

During this phase, current and international related literature using books, periodicals, journals, magazines and internet were reviewed by the researcher to be more acquainted with the research problem and to design the study tool.

Validity and Reliability

Testing validity of the designed tools by inspecting the items to determine whether the tool measure what supposed to measure. The tool was revised by a jury of 3 experts from different academic categories (professors and assistant professors) of the pediatric nursing department's staff at the Faculty of Nursing, Ain Shams University. The jury reviewed the tools for clarity, relevance, comprehensiveness and simplicity. Minor modification was done in form of omission or rephrasing of statements.

Testing reliability

The internal consistency was measured to identify the extent to which the items of tools measure the same concept and correlate with each other. The Cronbach Alpha coefficient of the tool was 0.78.

Pilot study:

A pilot study was conducted on 10% of the total sample size of the studied subjects to evaluate the clarity and the applicability of the study tools and to estimate the time needed to fill data gathering tools. After obtaining the result of the pilot study, the ambiguous items were omitted; other items were added or modified according to the study subject's response, then final form was developed. Students included in the pilot study were excluded from the study sample later.

Field work:

Data collection for this study was carried out in a period from the 1st of October until the end of December, 2022. The pediatric nursing course was taught by a nursing teacher control group students (& study groups) according to pre-designated schedule of the allocated hours. While flipped class intervention was taught by the researcher for the study group only. The study was carried out in the following phases; planning, implementation and evaluation.

Then students were divided randomly into two groups: While the researcher obtained their attendance sheet and classify them into study and control groups according to their number in the attendance sheet (one by one selection).

The control group: received traditional nursing education, where the pediatric nursing course was taught by the nursing department.

The study group: were subjected to flipped class strategy intervention by the researcher.

III. Administrative Design

Approval to conduct the research was obtained from the Dean of the Faculty of Nursing, Helwan University and the head of pediatric nursing department. As well as approval from the Training and Research Sector at the Egyptian Ministry of Health and Population. A clear explanation will be given about the nature, importance and expected outcomes of the study.

Ethical Considerations:

The protocol approval was obtained from the faculty Research Ethical Committee before conducting the study. A verbal consent was obtained from each student to ensure willingness to engage in the study. Clear and simple clarification of the study nature and its expected outcomes were explained. The students were secured that all data collected was treated in confidentiality and anonymity and for research purpose only. All the study subjects have the right to withdraw at any time from the study.

IV. Statistical Design :

The data collected were revised, coded, tabulated and statistically analysed by using number and percentage distribution were fulfilled using the Statistical Package for Social Sciences (SPSS) version 25. Chi-square test, mean and standard deviation were used to estimate the statistical significant difference between variables of the study.

Non-significant (NS) $P > 0.05$ Significant (S) $P < 0.05$

Highly significant (HS) $P < 0.01$

RESULTS

Table (1) revealed that, the mean age of students in both groups was 19.52±1.36 & 19.4±1.3 years respectively. As far as their gender more than half (56.7%) of them were male. Also nearly the majority of them (93.3% & 87.5%) in both groups were from urban areas. finally around half of them (51.1%) had an excellent grade in the previous academic year with no statistically significant difference between the study and control groups' characteristics.

Figure (1) showed that, less than three quarters (71.1%) of the students in the study group had poor level of critical thinking skills, compared to most of them (85.6%), had good level of critical thinking skills post intervention.

Figure (2) showed that, more than half (55%) of the students in the control group had poor level of critical thinking skills, compared to almost half of them (50 %), had good level of critical thinking skills post intervention.

Figure (3) showed that, less than three quarters (71.1%) of the students in the study group had poor level of flipped class knowledge, compared to almost half of them (91.1 %), had good level of flipped class knowledge post intervention.

Figure (4) showed that, more than half (55%) of the students in the control group had poor level of flipped class knowledge, compared to more than one quarter of them (30 %), had good level of critical thinking skills post intervention.

Table (2) clarified that, there was no statistical significant difference between the students' characteristics and total critical thinking skill scores pre intervention. In addition, there was statistical significant difference between the students' gender and Total critical thinking skill scores post intervention Table (3) revealed that, there was no statistical significant difference between the students' age, gender, residence and previous academic year grade and their total knowledge regarding flipped class knowledge pre/post intervention.

Table (4) clarified that, there was no statistical significant correlation between the total students' knowledge regarding flipped class and their total Critical Thinking Skills scores in the study group pre intervention. While there was a highly statistical significant correlation post intervention r=0.91. Where, the students who had grater knowledge of flipped class had higher Critical Thinking Skills scores.

Table (1): Number and percentage distribution of the studied students according to their characteristics (N=180).

Item	The studied subjects				X^2	P-value
	Study (n=90)		Control (n=90)			
	No.	%	No.	%		
Student's age (years)						
18 < 20	50	55.6	56	57.5	.54	.76
20 < 22	33	36.7	30	37.5		
22< 24	7	7.8	4	5.0		
$\bar{X}$ ± SD	19.52±1.36		19.4±1.3			
Gender						
Male	51	**56.7**	46	45	2.3	.12
Female	39	43.3	44	55		
Residence						
Rural	6	6.7	10	12.5	1.7	.19
Urban	84	93.3	800	87.5		
Previous academic year grade-						
Excellent	46	51.1	46	51.1	3.92	.27
Very good	32	35.6	25	31.3		
Good	11	12.2	15	18.8		
Pass	1	1.1	4	5.0		

Figure (1): Distribution of the Students in the Study Group according to their Total Critical Thinking Skills pre/post Intervention (n=90).

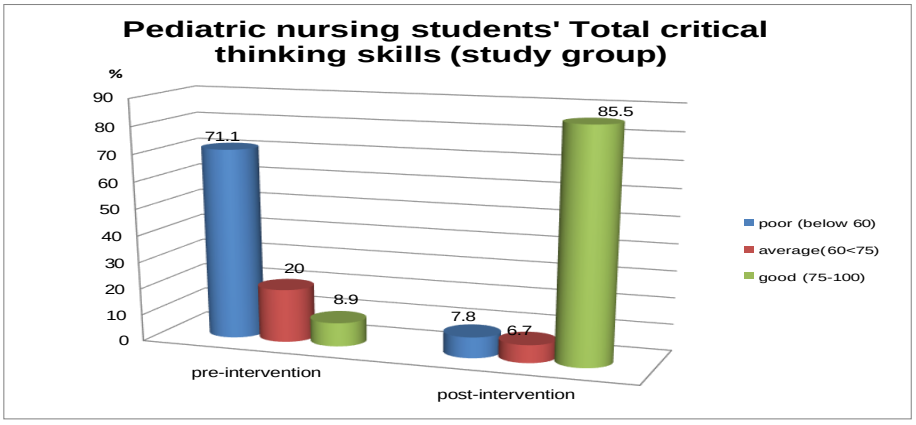

Figure (2): Distribution of the Students in the Control Group according to their Total Critical Thinking Skills pre/post Intervention (n=90).

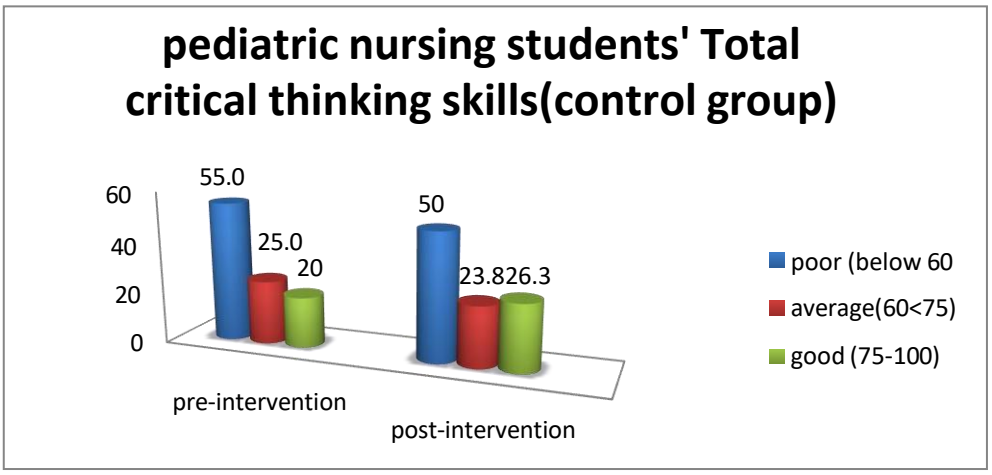

Figure (3): Distribution of the Students in the Study Group according to their Total Critical Thinking Skills pre/post Intervention (n=90)

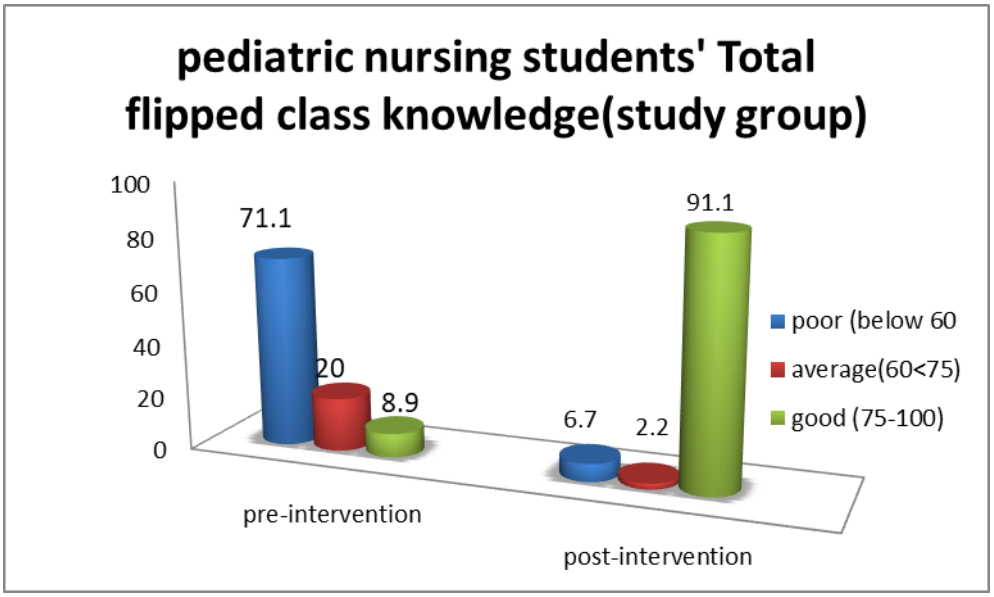

Figure (4): Distribution of the Students in the Study Group according to their Total Critical Thinking Skills pre/post Intervention (n=90)

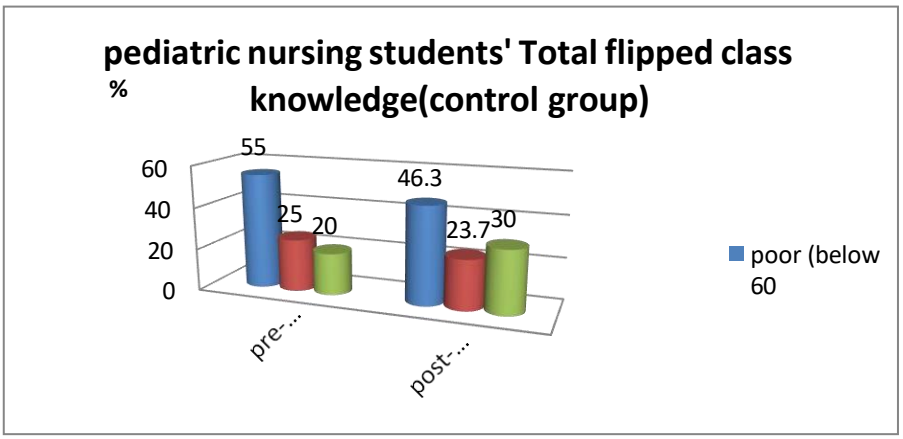
pediatric nursing students' Total flipped class knowledge(control group)
%
60
40
20
0
55
25
20
46.3
23.7
30
pre-...
post-...
poor (below 60

Table (2): The relation between the students in the study group' characteristics and their total critical thinking skills pre/post intervention (n=90).

Personal characteristics items		critical thinking skills pre intervention						X^2	P value	critical thinking skills Post intervention						X^2	P value
		Poor		Average		Good				Poor		Average		Good			
		No	%	No	%	No	%			No	%	No	%	No	%		
Age	18 < 20	38	42.2	7	7.8	5	5.6	3.15	0.53	6	6.7	3	3.3	41	45.6	3.49	0.47
	20 < 22	21	23.3	9	10.0	3	3.3			1	1.1	2	2.2	30	33.3		
	22< 24	5	5.6	2	2.2	0	0.0			0	0.0	1	1.1	6	6.7		
Gender	Male	38	42.2	9	10.0	4	4.4	0.66	0.71	1	1.1	5	5.6	45	50.0	6.9	0.03
	Female	26	28.9	9	10.0	4	4.4			6	6.7	1	1.1	32	35.6		
Residence	Rural	5	5.6	1	1.1	0	0.0	0.74	0.69	0	0.0	0	0.0	6	6.7	1.08	0.58
	Urban	59	65.6	17	18.9	8	8.9			7	7.8	6	6.7	71	78.9		
Previous academic year grade	Excellent	31	34.4	10	11.1	5	5.6	1.9	0.9	3	3.3	3	3.3	40	44.4	2.25	0.89
	Very good	25	27.8	5	5.6	2	2.2			4	4.4	2	2.2	26	28.9		
	Good	7	7.8	3	3.3	1	1.1			0	0.0	1	1.1	10	11.1		
	Pass	1	1.1	0	0.0	0	0.0			0	0.0	0	0.0	1	1.1		

Table (3): The relation between the Students in the Study Group' Characteristics and their Total Flipped class knowledge pre/post Intervention (n=90).

Personal characteristics items		Flipped class knowledge pre intervention						X^2	P value	Flipped class knowledge post intervention						X^2	P value
		Poor		Average		Good				Poor		Average		Good			
		No	%	No	%	No	%			No	%	No	%	No	%		
Age	18 < 20	31	34.4	1	1.1	18	20.0	2.26	0.68	5	5.6	1	1.1	44	48.9	7.4	0.11
	20 < 22	25	27.8	0	0.0	8	8.9			1	1.1	0	0.0	32	35.6		
	22< 24	5	5.6	0	0.0	2	2.2			0	0.0	1	1.1	6	6.7		
Gender	Male	33	36.7	1	1.1	17	18.9	1.11	0.57	5	5.6	0	0.0	50	55.6	4.39	0.11
	Female	28	31.1	0	0.0	11	12.2			1	1.1	2	2.2	32	35.6		
Residence	Rural	4	4.4	0	0.0	2	2.2	0.08	0.95	0	0.0	0	0	6	6.7	5.5	0.06
	Urban	57	63.3	1	1.1	26	28.9			6	6.7	2	2.2	76	84.4		
Previous academic year grade	Excellent	29	32.2	1	1.1	16	17.8	4.23	0.64	3	3.3	0	0.0	43	47.8	4.7	0.57
	Very good	24	26.7	0	0.0	8	8.9			3	3.3	1	1.1	28	31.1		
	Good	8	8.9	0	0.0	3	3.3			0	0.0	1	1.1	10	11.1		
	Pass	0	0.0	0	0.0	1	1.1			0	0.0	0	0.0	1	1.1		

*Significant at the level of < 0.05
** Highly statistical significant the level of < 0.01

Table (4): Correlation between the Total Flipped class Knowledge and the Total Critical Thinking Skills of the Students in the Study Group Pre/Post Intervention (n=90).

Item	Total Critical Thinking Skills scores n= 90	
Students' total knowledge regarding flipped class (pre intervention)	r	p-value
	.04	.33
Students' total knowledge regarding flipped class (post intervention)	0.91	0.001**

r = correlation coefficient.
*Significant at the level of < 0.05
** Highly statistical significant at the level of < 0.01

DISCUSSION

There is a huge gap between nursing practice and nursing education. Traditional lecture-based education is inadequate in enabling students to develop higher level thinking abilities such as critical thinking skills (**Yu et al., 2021).**

Concerning the characteristics of the students in study and control groups (table, 1), the current study revealed that, the mean age of the study group was 19.52±1.36 years and that of the control group was

19.4±1.3 years. The male represented more than half of students in both groups, almost the students from urban areas represented the majority of students in study and control groups. In addition, around half of students had obtained an excellent grade as a Previous academic year grade.

These findings were supported by Zidan et al, (2020), who studied "Effectiveness of flipped classroom approach on safe medication administration learning skill among nursing students" and found that, the mean age of both groups was nearly equal, the mean age of the control group was 19.70 ± 0.73, years and that of the study group was 19.55 ± 0.60 years.

Concerning the critical thinking skills of study group (figure, 1). The current study findings revealed a highly statistical significance difference ($p<0.01$) among the students in the study group regarding their critical thinking skills namely, analysis skills, reasoning skills, problem solving skills, decision making skills and evaluation skills pre and post intervention. The results denoted that, most of the students in the study group had poor level regarding critical thinking skills pre intervention. While, there was an improvement in the level of critical thinking skills among the students post intervention.

The current study results(figure, 2) are consistent with Sezer et al.,(2022) who studied "Impact of flipped classroom approach on undergraduate nursing student's critical thinking skills" and stated that he results indicate that the flipped classroom approach has no significantly different effect on students' academic achievement and critical thinking. Also, the current study results are consistent with El-Banna ., (2017) who studied "Flipping around the classroom: Accelerated Bachelor of Science in Nursing students' satisfaction and achievement" and concluded that both teaching approaches which are traditional and flipped class strategy prepared students for success on exams. And so the critical thinking skills of students didn't improve remarkably.

Concerning the knowledge of the study group regarding flipped class strategy The current study findings were supported by (Arslan, 2020) who revealed that pre class activities include watching online materials and performing research and class time activities include problem solving activities and presentations.

The current study findings were supported by (Liu et al., 2018; Chung and Lai, 2010) who highlighted self-learning, learning journals, reflection and evaluation as a post class activities.

The current study findings were in agreement with Evans et al., (2019) who investigated "Flipping the classroom in health care higher education: a systematic review" and enumerated that the most frequently adopted learning strategy in the class was group activities, assignments, presentations, projects, or discussion of topics

The current study findings (tables 2-3) revealed a highly statistical significance difference ($p<0.01$) among the students in the study group regarding their critical thinking skills namely, analysis skills, reasoning skills, problem solving skills, decision making skills and evaluation skills pre and post intervention. The results denoted that, most of the students in the study group had poor level regarding critical thinking skills pre intervention. While, there was an improvement in the level of critical thinking skills among the students post intervention.

These findings were in an agreement with Andrini etal., (2019), who conducted a study with title " The effect of flipped classroom and project based learning model on student's critical thinking ability " and concluded that the learning process through flipped class strategy affects critical thinking ability where students' level of critical thinking was poor pre intervention and then it had a remarkable improvement.

The current study findings (table, 4), revealed a high significant correlation (p value .001**) between the and knowledge of flipped class strategy and their total Critical Thinking Skills among the students in the study group post intervention.

The current study findings were in agreement with Doo., (2022). In his study of "Understanding Flipped Learners' Perceptions, Perceived Usefulness, Registration Intention, and Learning Engagement" and showed that there was a relationship between students' perception regarding flipped class strategy and their critical thinking skills.

Additionally, Acun, A. (2024), in his study titled with "The effect of flipped learning on nursing students' Asepsis knowledge and learning skills: A randomized controlled study" and showed that the studied nursing students had good level of flipped class knowledge and improved critical thinking skills levels.

CONCLUSION AND RECOMMENDATION

Pediatic nursing students who exposed to the intervention of flipped class strategy exhibited an improvement in the critical thinking skills in pediatric nursing course.

It can be recommended that:

Provide training course for nursing students about flipped class strategy.

Urge institute administrator to include flipped class strategy in the curriculum as an evidence-based nursing education strategy.

Integrate flipped class strategy as a method of teaching in pediatric nursing course and other nursing courses.

Training for the nursing students on how to use the available resources needed to explore the flipped content of learning materials.

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