Effect of Team Based Learning on the Core Competencies and Cognitive Engagement of Maternity Nursing Students

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Abstract:

Background: efficiently assisting students in achieving core competencies is a crucial aspect of nursing education. Team-based learning is one strategy that has been suggested to enhance nursing education (TBL). **Aim:** to assess the effect of team-based learning on core competencies and cognitive engagement of maternity nursing students. **Design:** a true experimental study design was applied **Setting**: This study was implemented at the faculty of nursing in Beni-Suef University. **Subjects:** a purposive sample composed of 160 student out of 274 third years maternity and newborn health nursing students in their 1st semester of the academic year 2023-2024. **Tools:** the data were gathered using three instruments; a structured interviewing questionnaire, core competencies instrument, and cognitive engagement instrument**. Results:** revealed that, within control group &study group, pre-intervention, there was insignificant difference in total core competencies and cognitive engagement. While post intervention, there was an improvement that is statistically significant in the total competencies and cognitive engagement in study group (p= 0.037*) compared to the control group. **Conclusion**: the TBL program was successful in enhancing the critical thinking, self-leadership, problem-solving skills, communication skills, and finally cognitive engagement of nursing students. For this reason, TBL is seen to be a helpful learning and teaching technique that can optimize the learning outcomes for maternity nursing students in programs for women's health nursing. **Recommendation:** the results imply implementing longitudinal studies to assess the long-term impact of TBL on students' clinical performance, retention of knowledge, and professional development after graduation.

Keywords: cognitive engagement - core competencies- team -based learning .

Introduction:

One of the required basic courses for nursing students is maternity nursing. Its instruction emphasizes the integration of academic knowledge and clinical practice and is abstract, challenging to understand, professional, and technical **(Hailu et al., 2021).** The two most important elements influencing effective teaching are the learning environment and the lesson plan, which are also the keys to raising the caliber of instruction and an efficient way to meet learning objectives (**Xiaomang et al., 2020).**

The nursing field is complicated and dispersed. The academic atmosphere is demanding, and the most prepared students have more stronger intellectual and clinical backgrounds. Therefore, in order Nursing programs should provide outstanding teaching based on the most current scientific findings to improve the quality of learning and the overall educational experience of students. **(Torbjørnsen et al.,2021).** In addition to the theoretical knowledge taught in the lecture, efforts should be made to acquire other learning characteristics from the practical session, such as affective and psychomotor learning competencies **(Hadie, 2018).**

It is not sufficient for a teacher in a traditional learning method to simply transmit content; instead, team-based learning (TBL) integrates more flexible, small-group tasks with aspects of direct instruction (dictating the material to be studied, talking in front of the entire class) **(Yeung et al., 2023).**

Team-based learning (TBL) give nursing students the tools they need for applying their experience in rapidly changing emergencies in a clinical environment by strengthening their understanding of complicated clinical situations, problem-solving

ability, clinical performance, communication ability, academic achievement, classroom engagement and class satisfaction, especially in lower achieving students **(Yoon& Lee, 2017 , Dearnley et al.,2018**).

The capacity to practice nursing in a way that satisfies patients' requirements by applying precise nursing techniques and logical reasoning is defined as a core competency in the field. The four talents and skills that comprise the nursing competency structure are understanding needs, providing care, collaborating, and supporting decision-making. These four skills are used in all kinds of nursing practice situations and are strongly related to one another **(Weeks & Pontin, 2020).**

A health care practitioner's core competency is the combination of skills, knowledge, and attitudes necessary to carry out caregiving tasks effectively and efficiently. Before graduating, these attributes must be mastered because they are necessary in particular circumstances to manage a variety of difficult clinical scenarios **(Choi, 2016).** According to the student participation idea, students who are more involved in college will learn more and have more opportunities for personal growth (**Wang et al., 2021).**

Psychological and cognitive components make up classroom engagement. A psychological concept known as cognitive engagement is demonstrated by students' actions as an effort to fully comprehend the material they are expected to learn. Consider their commitment to ideas and readiness to act when interpreting their thinking (**Huda et al., 2018).** Academic achievement, persistence, and happiness all have an impact on students' involvement, or the distribution of their attention in an active response to the environment (**Wang et al., 2022).** Different degrees of engagement's quality and intensity may be required. So the student must take an active part in class, from pay attention to what's being done, to show curiosity and perseverance **(Perkmann, 2020).**

It has been reported that in the literature the traditional course of maternity nursing focuses on the theoretical teaching and operation demonstration training, and ignoring the cultivation of the comprehensive abilities such as critical thinking, self-learning, practical application ability, and communication skills. Accordingly, students used to passively accept knowledge **(Xiaomang et al.,2020).** Given how quickly the healthcare and hospital sectors are changing, it stands to reason that nursing education approach and classroom instruction should also change and advance **(Kluwer, 2022).**

Significance of the problem:

The most recent published reports by United Nations (UN) agencies stated that a woman dies during pregnancy or childbirth every two minutes **(WHO, 2023).** Today's nurses have to make critical decisions in a range of patient situations and work effectively across many departments using a range of technology platforms. Because students can study in an environment that most nearly resembles actual, on-the-job nursing circumstances, the use of active learning methodologies facilitates a more seamless transition into the workplace **(Kluwer, 2022).**

The goal of nursing education is to produce highly skilled nurses who possess the fundamental skills, beliefs, and behaviors. Although some evidence suggests that TBL can enhance individual competencies such as critical thinking, communication competence, and problem solving ability, few studies (just one study) have looked at how well TBL can improve the core competencies of nursing student education as a whole. Therefore, The purpose of this research was to implement TBL in maternity nursing classes, determine how TBL affects students' communication, self-directed learning, and problem-solving skills, and assist maternity nursing students in mastering the professional competencies required for nursing care to improve women's health.

Aim of the study:

The current study aimed to assess the effect of TBL on core competencies and

cognitive engagement of maternity nursing students.

This had been accomplished through the following objectives:

1)
Assessment of core competencies in nursing education and cognitive engagement among each nursing student preprogram.

2)
Developing & applying a team-based learning program through class educational sessions.

3)
Evaluating effects of team-based learning program on maternity nursing students' core competencies and cognitive engagement.

Research hypotheses:

the study was hypothesized that:

-The core competencies of nursing students who learned by TBL would be significantly better than those learned by traditional lecture-style method

-The cognitive engagement of nursing students who learned by TBL would be significantly better than those learned by traditional lecture-style method.

Operational definitions

Core competencies

Are a set of social, intellectual, emotional, and personal competencies that all students must possess in order to pursue an extensive, lifetime learning process. Core competencies are essential to the nursing profession because they support the delivery of high-quality, effective care and also hold special meaning for the field **(Annigeri, 2022).**

Critical thinking

Refers to the process of "actively and effectively developing, applying, interpreting, and/or evaluating information generated as a guide for belief and action, gathered from, or generated by, experience, thought, observation, or communication **(Loseby, 2019).**

Self-leadership

Is a method by which people employ three sets of techniques toA change their own behavior: natural reward schemes, behavior-focused tactics, and constructive thought patterns **(Neck et al.,2020).**

Problem solving D

Is the rigorously academic process of actively and expertly developing, applying, interpreting, synthesizing, aEd/or assessing data obtained from, or produced as a guide for belief and behavior through observation, experience, introspection, reasoning, or communication **(Durmaz et al., 2018).**

Communication competence

It is an effective tool for enhancing nursing care, and nurses' communication skills. It's valued as professional attributes and are essential to building therapeutic relationships with patients to increase the effectiveness of nursing care **(li et al.,2019).**

Cognitive engagement

Refers to the cognitive techniques and psychological resources that students employ to understand complicated facts and phenomena during learning operations, that is, the ability of learners to use cognitive approaches in the learning process **(Dubovi, 2022).**

Material and methods:

Setting:

The study was conducted on third-year maternity nursing students in the maternity lecture classroom at Faculty of Nursing, Beni-Suef University.

Design:

A true experimental study design was applied. This design examine the causal connections between the variables being

studied. The research methodology calls for assessing the dependent variable, randomly allocating participants to various groups, and adjusting an independent variable.

Sampling:

A purposive sample composed of 160 student accepted to take part in this study out of 274 third years maternity and newborn health nursing students in their 1st semester of the academic year 2023-2024. The number of students corresponded to the required sample size which was determined using the following formula**(Chandrasekharan et al., 2019)**:

n= N/{1+N(e)2}

Where n is the sample size, N refers to population size is 274, and e= 0.05.

n= 274/ {1+274 (0.0025)} = 160 student.

The researchers used the Card Draw or Lottery random selection methods by providing each student with a card or piece of paper with a group number on it (e.g., 1, 2), then shuffling the cards and having each student draw one.

1.**Students with the card of number one form study group** (80 maternity nursing students), learned by team based learning.

2.**Students with the card of number two form control group** (80 maternity nursing students) learned by traditional lecture-style method.

In TBL, the goal is to create balanced teams that work together throughout the course. The same method of randomization was used to form ten groups as the students who draw the same letter (A, B, C, etc.) form a team.

Tools for data collection:

The data were collected using three tools.

Tool I: A structured interviewing questionnaire consisted of socio-demographic characteristics' of students such as age, gender, academic achievement, inter-personal relationship and if engaged in a high-risk pregnancy exercise in the past at this faculty?

Tool II: Core competencies which included four parts:

Part 1. Critical thinking tool:

The capacity for critical thinking of the students was measured by a critical thinking disposition instrument by Yoon (YCTD) **(Yoon, 2004).** It comprises of 6 subscales with 27 items. The subscales of intellectual eagerness/curiosity, objectivity, prudence, systematicity, intellectual fairness, and healthy skepticism comprise this instrument. A five-point rating system, with 1 denoting very strongly disagree and 5 denoting very strongly agree, is used for each item. The total of each item's score and the total (YCTD) is calculated by the sum of its domain scores. Higher scores signified higher CTD. In Hur's study, the Cronbach's alpha was.72; in our study, it was.88 **(Hur, 2003).**

Part 2.The abbreviated revised self-leadership questionnaire: To measure the self-leadership of the students, the revised self-leadership questionnaire for the measurement of self-leadership skills, behaviors, and cognitions was used. This questionnaire was developed by **Houghton and Neck(2002)** and changed and supplemented by **shin et al., (2009**).This tool is includes 35 items, each of which has a 5-point rating system; higher scores correspond to stronger levels of self-leadership. When the instrument was developed **(Shin et al., 2009),** the Cronbach's alpha was.73Y.83, and it was.89 in this study.

Part 3. Problem Solving Process Inventory: To evaluate the level of problem-solving ability of the students, a 25 item instrument that was created by **Lee (1978),** as referenced in **Park and Woo, (1999),** and **Park and Woo (1999)** added to and updated it. Every item is graded on a 5-point rating system, where higher scores correspond to greater problem-solving skills when the instruments were developed and during the course of research, the Cronbach's alpha was both.89.

Part 4. Communication Competence Scale: To measure communication competence of the students, the global interpersonal communication competence scale, which is changed by **Hur (2003)** by including seven elements in addition to the eight that **Rubin (1990)** had initially suggested. There are fifteen elements on this measure, and higher scores denote increased communication competency. In Hur's study, the Cronbach's alpha was.72**(Hur, 2003)**; in our study, it was.88.

Scoring system:-

Items	No. items	Scoring		
		Poor (less than 65%)	Average (65% to 80%)	Good (more than 80%)
Critical thinking				
Confidence	4(20)	13	Less than 16	Equal or more than 16
Eager	5(25)	16.25	20	20
Fairness	4(20)	13	Less than 16	Equal or more than 16
Objectivity	7(35)	22.75	28	28
Skepticism	4(20)	13	Less than 16	Equal or more than 16
Systematicity	3(15)	9.75	12	12
Total critical thinking	27 item (135)	87.75	108	108
Total self-leadership practices skills	9 (45)	29.25	36	36
Total problem solving process inventory skills	35 (210)	136.5	168	168
Total communication competence skills	31 (155)	100.75	124	124
Total cognitive engagement	4	13	16	Less than 16
Total skills	131*5 (655)	425.75	556.75	556.75

Tool III: Cognitive engagement

An instrument for situational cognitive engagement measuring four items each of three aspects was used to measure cognitive involvement **(Rotgans et al.,2018).** Elements (1) engagement in the current task item (1); I am engaged with the topic at hand, elements (2) effort and persistence item (2): I put in a lot of effort understanding the topic, and elements (3) experience of flow or having been totally absorbed by the activity item (3): I wish I could still continue for a while; and item (4); I am so involved that I forget everything around me. A Likert scale of five points was used to rate each item: 1 for "not true at all," 2 for "not true for me," 3 for "neutral," 4 for "true for me," and 5 for "very true for me." **(Schraw et al., 2001).** Hancock suggested using a cut-off value of.70 for the coefficient H. **(Hancock et al., 2001)**

Ethical considerations:

The approvals for the research were gained from Scientific Ethical Committee in the faculty of medicine at Beni- Sueif University and the dean of the faculty of nursing before starting the study. Students who took part of the study were informed of its goals in order gain their trust and confidence. Additionally, the researcher guaranteed the privacy and confidentiality of the student's data.

The Tools Validity:

Five maternal and child health nursing specialists reviewed the instruments before the study to ensure that the information was correct and relevant. There was a 98% content validity index. An expert's recommendation was carried out.

Pilot study was done on 16 nursing students (10%) of students under the study to examine the applicability, the efficiency and clarity of the tools, and then the tools were modified accordingly.

Field work:

This study was conducted by following these procedures:

Preparation phase

The researchers reviewed related literature and theoretical knowledge concerning TBL using books and articles. This phase guided the researchers to prepare the required data collection tools and prepare the TBL content.

- Data were collected from the beginning of the 1st semester from October to the end of November 2023 after attaining the approval to conduct the study; Each session was administered in one weekly 2-hour class according to lectures plan.

Team-based learning is a structured set of methods to maximize the outcomes of both individual students and their teams through individual learning and interactions among team members **(Haid et al., 2012)**. Considering the comprehension level of the students , the researcher, developed ill-defined case studies with four open ended questions and multiple choice questions for the individual readiness assurance test(IRAT) and group readiness assurance test(GRAT) based on providing nursing care for high-risk pregnancy**(**pre-eclampsia, diabetes, anemia, placenta previa) then the questions were reviewed and modified by a panel of maternity nursing professors.

Students Preparation;

The first session; (self-learning) , the researcher introduced herself to students and explained the purpose ,steps, and benefits of team based learning and the role of each one in the team as follow: recorder, leader, checker and time keeper.

- After obtaining their verbal consent, the students filled out the questionnaire to assess their socio demo-graphic data, core competencies and engagement before conducting the team based learning using(Tool I,II and III).
- The researchers assigned the students randomly into study group where the TBL was applied in addition to a traditional lecture format and control group where lecture-based course only was administered.
- The researcher asked study group of student to read about **(**preeclampsia, diabetes, anemia, placenta previa). pre-assigned instructional materials, such as PowerPoint materials, lectures, or videos on the primary materials for each topic were made available one week prior to the use of TBL. Meanwhile, to represent the students' learning environment, students in the control group just had to complete a reading assignment that was relevant to the chosen subjects.
- The classes of the study group were divided into ten groups each group composed of eight students with selected name and well-defined team recorder, leader, checker and time keeper.

Evaluation of readiness assurance using tests and feedback

The second sessions:

- To evaluate each student's preparation for each topic, the TBL group gave them a pre-class assignment consisting of structure identification questions, which they were required to complete within 10 minutes of the start of the TBL tutorials. Students were not provided with the correct answers because they had to respond to the same questions in their teams.
- The students in each team were then told to assemble a circle and retake the same exam (20 minutes). As a group, the students were free to debate and select their responses to the questions. Following the completion of each team's reply, each team presenter was allowed to discuss their responses in among the other groups, providing justification and explanation for their decisions.
- The researcher promptly provided comments on the teams' responses in (20 minutes), providing explanations and correcting any misunderstandings that occurred.

The third and fourth sessions group: implementation exercise(40 minutes) and group discussion (40 minutes):

- Following that, students participated in a group implementation exercise where they presented four ill-defined case studies (40

minutes) that mirrored actual problems. This allowed them to apply the knowledge they had learned from reading the course material about high-risk pregnancy scenarios.

- Each team worked on the identical case studies, and the students in each team discussed the information they had learned to choose which response was best for the case scenarios.
- The researchers went around each group, offering advice and monitoring as the students worked on their case studies.
- Next, the team presenters presented their answers to the case scenarios to the other groups, and each team discussed how they arrived at their decision.

The fifth session: application of course contents.

- For students in both case and control groups, the researchers provided typical lecture explanations on the nursing care of high-risk pregnancy (preeclampsia, diabetes, anemia, and placenta previa) in one weekly 2-hour class.

Evaluation phase (45 minutes)

- Core competencies skills and cognitive engagement of the study and control groups were assessed using Tools II and III after the application of the TBL.

Limitation of the Study:

The efficacy of TBL activities may be limited by time constraints in the curriculum. To overcome time constraints in implementing team-based learning (TBL) for maternity nursing students, the researchers applied the following strategies: organized the calendar to accommodate longer sessions or fewer subjects covered in greater detail and aligned TBL activities with the current course objectives to minimize duplication.

III- Statistical design

Data analysis was done with IBM SPSS ver. 27 for Windows. The frequency, percentage, average, and standard deviation of the respondents' general characteristics were examined. To determine whether the dependent variables and general features of both the control and the experimental groups were homogeneous, the chi-square and t-tests were employed. The independent t-test was utilized to evaluate the experimental group's pre- and post-TBL communication, problem-solving, and self-directed learning abilities to those of the control group in order to validate the specified hypotheses. For both pre- and after the fact verification in each group, the paired t-test was employed. After TBL, both the experimental as well as control groups' differences were analyzed using an independent t-test, and Cronbach's α was employed to assess the measuring devices' dependability.

Results

Table 1 presents no statistically significant variations ($p > 0.05$) between the socio-demographic data of the study and control groups, with over half of the students in each group being older than 21 or 22 years old, respectively. Concerning, gender (56.3% & 65.0 %) of the control and study groups respectively were female. In relation to academic achievements (41.3 % and 58.8 %) of the control and studied groups had good achievement (70-79%), respectively. In addition, (45.0% & 47.5%) of control and study groups had good interpersonal relationship respectively. it should be noted that no one of the control or study group had engaged in a high-risk pregnancy exercise in the past.

Table 2 reveals slight not statistically significant improvement in total core competencies skills and cognitive engagement among control group during posttest when compared with pretest($p> 0.05$).

Improvement in the test scores was found to be highly significant within the study group learned by TBL. As **table 3** reflect that TBL had successfully increased the students' total core competencies skills score in term of critical thinking, self-leadership practices skills, problem solving ability, and communication competence skills posttest when compared with pretest($p\leq0.01$). Moreover, the cognitive engagement score of third year nursing students who underwent the TBL was found to be significantly higher than pretest as (82.5%,12.5%, respectively) of students in the study group had a poor and good level of

cognitive engagement before the implementation of team based learning, while (10.0%,75.0%) of them had poor and good level of engagement after the implementation of the team-based learning, respectively($p \leq 0.01$).

Figure 1 shows that (23.80%,0.0%,respectively) of students in the control group had a poor and good level of cognitive engagement before the traditional method of learning while (5%, 0.0%) of them had a poor and good level of cognitive engagement after the implementation of the traditional method of learning, respectively. On the other hand, (56.30%,0.0%,respectively) of students in the study group had a poor and good level of cognitive engagement before the implementation of team based strategy, while (2.50%, 75.0%) of them had a poor and good level of cognitive engagement immediately after the implementation of the team-based learning strategies.

Table 4 showed that a positive non-significant correlation between the total skills and total critical thinking(r= .194,p=0.085), total self-leadership practices skills(r= .143,p=0.206), and cognitive engagement(r= .056,p=0.620) among the study group in pre intervention phase. While; a strong positive significant correlation was observed between total skills, total problem solving process(r= .496,p=0.000**), and total communication competence skills(r= .484,p=0.000**).

Table 5 shows that a strong positive significant correlation was observed between the total skills and total critical thinking(r= .492,p=0.000**), total self-leadership practices(r= .523,p=0.000**), total problem solving process(r= .668,p=0.000**), total communication competence skills(r= .575,p=0.000**), and cognitive engagement(r.290,p=0.000**), among the study group in post intervention phase ($p \leq 0.01$).

Table (1): Distribution of socio-demographic characteristic of the studied students (n=160).

Items	Control group (n=80)		Study group (n=80)		X^2	p value
	N	%	N	%		
Age						
21years	43	53.75	35	43.8		
22 -23 years	37	46.25	45	56.3	2.076	0.150
Mean ±SD	21.75±1.34		21.13±1.72			
Gender						
Male	35	43.8	28	35.0	1.688	0.194
Female	45	56.3	52	65.0		
Academic achievements						
<70	19	23.8	12	15.0		
70-79	33	41.3	47	58.8	15.339	0.082
80-89	22	27.5	13	16.3		
90- 100	6	7.5	8	10.0		
Interpersonal relationship						
Good	36	45.0	38	47.5	6.478	0.166
Neural	15	18.8	19	23.8		
Poor	29	36.3	23	28.7		
Have you ever engaged in a high-risk pregnancy exercise in the past at this faculty ?						
Yes	00	00	00	00		
No	80	100.0	80	100.0		

Table (2): Distribution of total core competencies skills and cognitive engagement among control group during pretest and posttest (n=80)

Items	Pretest						Mean ±SD	Posttest						Mean ±SD	X^2	p value
	Poor		Average		Good			Poor		Average		Good				
	N	%	N	%	N	%		N	%	N	%	N	%			
Total critical thinking	58	72.5	21	26	1	1.3	83.97±8.02	46	57.5	19	23.8	15	18.8	93.59±15.99	5.905	0.206
Total self-leadership practices skills	60	75.0	9	11	11	13.8	30.98±4.01	57	71.3	10	12.5	13	16.3	29.35±5.49	1.448	0.836
Total problem solving process ventory skills	46	57.5	21	26	13	16.3	146.72±26.7	43	53.8	23	28.7	14	17.5	147.46±30.7	2.858	0.582
Total communication competence skills	51	63.7	15	18	14	17.5	108.65±19.1	46	57.5	16	20.0	18	22.5	111.06±17.4	1.158	0.885
Total clinical confidence skills	42	52.5	26	32	12	15.0	40.73±7.59	39	48.8	26	32.4	15	18.8	41.37±9.55	6.765	0.149
Total clinical competence instrument	55	68.8	14	17	11	13.8	25.82±4.28	52	65.0	15	18.8	13	16.2	26.55±5.90	5.334	0.255
Total cognitive engagement	48	60.0	17	21	15	18.8	13.45±2.67	43	53.8	17	21.2	20	25.0	14.40±3.09	6.702	0.152
Total skills	19	23.8	61	76	0	0.0	450.35±34.1	19	23.8	57	71.3	4	5.0	463.38±47.8	2.498	0.287

* Statistically significant at p≤0.05 ** Highly statistical significant at p≤0.01

Table (3): Distribution of total core competencies skills and cognitive engagement among study group during pretest and posttest (n=80)

Items	Pretest						Mean ±SD	Posttest						Mean ±SD	X^2	p value
	Poor		Average		Good			Poor		Average		Good				
	N	%	N	%	N	%		N	%	N	%	N	%			
Total critical thinking	65	81.3	15	18.8	0	0.0	79.20±7.97	3	3.8	0	0.0	77	96.3	118.60±9.48	9.985	0.000**
Total self-leadership practices skills	63	78.8	8	10.0	9	11.2	29.43±3.66	10	12.5	4	5.0	66	82.5	39.00±6.74	11.688	0.000**
Total problem solving process inventory skills	65	81.3	8	10.0	7	8.7	142.23±22.68	9	11.3	11	13.8	60	75.0	173.74±22.34	11.526	0.000**
Total communication competence skills	66	82.5	4	5.0	10	12.5	103.00±18.60	8	10.0	13	16.3	59	73.8	125.80±12.29	8.921	0.001**
Total clinical confidence skills	55	68.8	16	20.0	9	11.3	38.96±7.16	6	7.4	7	8.8	67	83.8	56.89±11.60	10.892	0.000**
Total clinical competence instrument	72	90.0	4	5.0	4	5.0	24.20±3.35	8	10.0	7	8.8	65	81.3	38.91±8.49	9.094	0.000**
Total cognitive engagement	66	82.5	4	5.0	10	12.5	12.46±2.17	8	10.0	12	15.0	60	75.0	16.63±3.29	9.473	0.000**
Total skills	45	56.3	35	43.8	0	0.0	429.50±30.86	2	2.5	18	22.5	60	75.0	569.56±44.57	9.707	0.000**

* Statistically significant at p≤0.05 ** highly statistical significant at p≤0.01

Figure (1): Distribution of control and study group regarding total cognitive engagement during pretest and posttest (n=80)

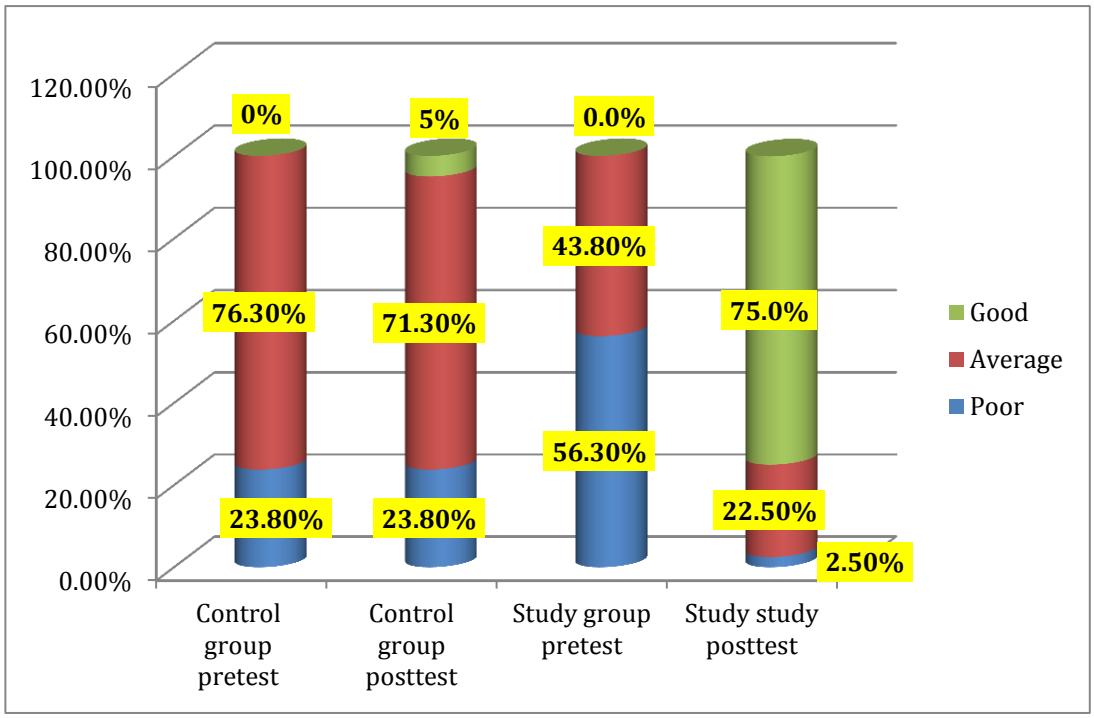

Table (4): Correlation between all variables (Pretest) among study group.

		Total critical thinking	Total self-leadership practices skills	Total problem solving process inventory skills	Total communication competence skills	Total cognitive engagement
Total critical thinking	r					
	p					
Total self-leadership practices skills	r	.062				
	p	0.586				
Total problem solving process inventory skills	r	.121	.109			
	p	0.285	0.336			
Total communication competence skills	r	.191	.045	.033		
	p	0.089	0.689	0.774		
Total cognitive engagement	r	.063	.156	.036	.069	
	p	0.577	0.054	0.748	0.543	
Total skills	r	.194	.143	.496	.484	.056
	p	0.085	0.206	0.000**	0.000**	0.620

* Positive correlation at p≤0.05 ** strong positive correlation at p≤0.01

Table (5): Correlation between all variables (Posttest) among study group.

		Total critical thinking	Total self-leadership practices skills	Total problem solving process inventory skills	Total communication competence skills	Total cognitive engagement
Total critical thinking	r					
	p					
Total self-leadership practices skills	r	.409				
	p	0.000**				
Total problem solving process inventory skills	r	.139	.059			
	p	0.218	0.604			
Total communication competence skills	r	.482	.519	.207		
	p	0.000**	0.000**	0.066		
Total cognitive engagement	r	.378	.195	.145	.252	
	p	0.000**	0.083	0.200	0.000**	
Total skills	r	.492	.523	.668	.575	.290
	p	0.000**	0.000**	0.000**	0.000**	0.000**

* positive correlation at $p \leq 0.05$ ** strong positive correlation at $p \leq 0.01$

Discussion

The customary instructor-focused classroom was a common practice in nursing education in previous decades. The capacity of the traditional teacher-centered classroom to deliver knowledge to students in a condensed period was undoubtedly its greatest benefit. However, this method of instruction made learners passive recipients of the material, resulting in inadequate learning outcomes and a decline in learners' ability to think critically and long-term memory recall **(Huang et al., 2016).** The Team-Based Learning (TBL) concept entails an immediate cycle of feedback both individual and group learning. Learning goals are met cooperatively through group discussion of knowledge acquired in classroom settings as a result of cooperative learning and group members' support of one another **(Alberti et al., 2021).**

This study was carried out to assess the effect of TBL on core competencies and cognitive engagement of maternity nursing students.

According to the current study's results, there were no statistically significant variations ($p > 0.05$) between the socio-demographic data of the study and control groups, with over half of the students in each group being older than 21 or 22 years old, respectively. Concerning, Gender; half and more of control and study groups, respectively were female. In relation to academic achievements ; near to half and more than half of control and study groups had good achievement (70-79%), respectively. In addition, in both the control and study groups, near to half had good interpersonal relationship, respectively. it should be noted that no one of the control or study group had engaged in a high-risk pregnancy exercise in the past.

According to the study findings; Among the study group that TBL taught, there was a highly significant improvement in test results. As TBL had successfully increased the students' total core competencies skills score in term of critical thinking, self-leadership practices skills, problem solving ability, and communication competence skills posttest when compared with pretest($p \leq 0.01$). The development of theses abilities from the perspective of the researcher was encouraged by the use of interactive learning methodologies. Through the application of exercises, TBL improves students' comprehension of the

subject matter and fortifies their capacity for critical thought and problem-solving. These findings align with the earlier research conducted by **Ho et al., 2022** in Hong Kong SAR, China, who assessed undergraduates studying physiotherapy and nursing after participating in inter-professional learning activities and found that team-based learning (TBL) has been shown to improve learning outcomes and foster the growth of students' interpersonal and critical thinking abilities, collaboration, and communication, It also has a positive impact on students' learning attitudes, such as satisfaction and classroom engagement, and their academic achievement. Also**,** with **Lee ,(2018)** in South Korea who evaluated the relative benefits of TBL versus lecture-style instruction on the core competencies skills required for nursing education and illustrated that; in comparison to the pretest, the experimental group scored substantially higher on the posttest in the areas of clinical competency, communication competence, critical thinking, and self-leadership ability.

The results of the current study demonstrated a highly statistically significant enhancement in the study group's critical thinking skills between the pre- and post-intervention phases. Based on the current study, the students worked together to solve complex problems, exposed to different viewpoints and approaches to problem-solving, and applied theoretical knowledge to real-world scenarios or case studies. Moreover, students had to clarify their own ideas, answer questions, explain concepts and issues to each other, and received immediate feedback from their peers and researchers, all of these activities assisted them to quickly identify gaps in their reasoning and correct them. These findings are in line with research done by **Sanad et al.,(2023)**in Kingdom of Saudi Arabia, who evaluated the impact of team-based learning on nursing students' academic achievement, critical thinking skills, and classroom engagement, and revealed that; the majority of nursing students through team-based learning report feeling engaged in the classroom and possessing strong critical thinking abilities.

Besides, **Espey, M., (2018)** in USA who investigated how college students view the growth of their academics and critical thinking abilities, with a particular emphasis on team-based learning (TBL), and revealed that, for the majority of the skills evaluated, students reported noticeably higher growth in critical thinking abilities in a TBL setting compared to regular classes.

When comparing with the pre intervention phase, the current study showed that there is highly statistically significant improvement of study group student's total self-leadership skills in the post intervention phase. It's possible that self-leadership has improved due to shared responsibility as each student was responsible for both their own learning and the success of their team encouraging them to contribute actively and adjusting their behavior fostering self-leadership. These outcomes were consistent with **Lee ,(2018)in South Korea** who found that TBL's built-in active learning approach helped to raise the self-leadership scores. Moreover, **Lee & Kang, (2021)** who assessed the impact of Team-Based Learning (TBL) educational approach on nursing students' critical thinking, interpersonal skills, sense of self-leadership, and academic major satisfaction, and found that the use of team-based collaborative learning can boost academic major satisfaction and have a good impact on nursing students' critical thinking, interpersonal skills, and sense of self-leadership.

According to the results of the current study, there has been a highly statistically significant improvement among study group students' overall communication competence skills between the pre- and post-intervention phases. From the researcher point of view, team-based learning inherently requires students to work in teams, discuss concepts, solve problems, defend their reasoning, and listen to others, which enhances both verbal and listening skills, receive peer feedback, communicate more effectively under time constraints, and build confidence in their ability to communicate through repeated practice in a team setting. Furthermore, the TBL developed with longer training sessions and more frequent

instruction, emphasizing the ability to communicate in various circumstances. Similarly, the research conducted by **Kim,(2019)** in Korea who investigated the effects of team-based learning on high-risk pregnant nurses' academic performance, problem-solving abilities, and communication skills and found that TBL improved the communication skill score of students receiving nursing education for high-risk pregnancies. It should be noted that the lack of study evidence on nursing students makes it challenging to compare our findings on communication ability directly with those of other studies.

Regarding problem solving process; According to the current study, there has been a highly substantial improvement in total problem solving process inventory among study group students in the post intervention phase compared to the pre intervention phase. Team-based learning (TBL) improves problem-solving skills through readiness assurance tests (RATs) and application exercises that provide immediate feedback. This helps students quickly identify gaps in their understanding and correct misconceptions, improving their problem-solving approach. This finding was in accordance with **Lee, (2018)** findings who found that; problem-solving ability and critical thinking ability improved after the intervention in both groups. Moreover, **Baek & Kim , (2016), Jun & Ju ,(2017)** in Korea, who assessed team-based learning's impact on students' capacity for self-directed learning, problem-solving skills, and communication in a nursing education program , and found that TBL proved successful in helping nursing students become more skilled at solving problems.

According to the present study, the cognitive engagement score of third year nursing students who underwent the TBL was found to be significantly higher than pretest as (82.5%,12.5%, respectively) of students in the study group had a poor and good level of engagement before the implementation of team based learning, while (10.0%,75.0%) of them had poor and good level of engagement after the implementation of the team-based learning, respectively($p \leq 0.01$). The nursing students have to discuss the subject matter with their peers after contributing their thoughts and sharing their knowledge, and comments from researchers. This raised their participation and engagement, which in turn improved the group's overall comprehension. These findings are in line with earlier research done by **Ibrahim(2018)** in Mansoura, Egypt , who evaluated how team-based learning affected or improved engagement among students and discovered that, in comparison to students in the control group who used the traditional method, employing TBL improved students' interaction and collaboration throughout learning sessions in the nursing administration course. Also, **Shamsuddin et al., (2021)** in Kelantan, who assessed the impact that the team-based learning (TBL) method on students' learning in practical gross anatomy classrooms and found that only the year 2 students showed significantly greater cognitive engagement levels in the TBL group. These findings achieved as senior students are more experienced and have acquired knowledge prior to the educational procedure.

Additionally, both **Chen et al., (2018)** in China, who conducted meta-analysis for examining the impact of team-based learning in Chinese medical school & **Hamada et al., (2020)** in Tsukuba Japan, who assessed the effectiveness of team-based learning in an interdisciplinary education programs for medical students noted that TBL improves student satisfaction, engagement, and collaboration. It also positively affects learning outcomes in terms of skill development, also the educational achievement fostered the growth of interpersonal skills, inter professional learning, and self-directed learning. Moreover, **Rotgans, (2018)** in Singapore, who investigated how cognitive engagement varies during a team-based learning, and discovered that continuous cognitive engagement in TBL results in appreciable knowledge gains.

There was a positive non-significant correlation between the total skills, total critical thinking (r= .194,p=0.085), total self-leadership practices skills (r=.143,p=0.206), and cognitive engagement (r= .056,p=0.620) among the study group in pre intervention phase. While; a

strong positive significant correlation was observed between total skills, total problem solving process (r= .496,p=0.000**), and total communication competence skills (r= .484,p=0.000**). This is logical because many core competencies, such as teamwork and leadership, are closely tied to effective communication. This finding is similar with **Yeung, et al., (2023)** findings in Hong Kong who investigated how well nursing students' critical thinking and problem-solving abilities are developed through team-based learning (TBL), and showed positive correlations between critical thinking, interpersonal relationships, self-leadership and academic major satisfaction.

Moreover, a strong positive significant correlation was observed between the total skills and total critical thinking(r= .492,p=0.000**), total self-leadership practices(r= .523,p=0.000**), total problem solving process(r= .668,p=0.000**), total communication competence skills(r= .575,p=0.000**), and cognitive engagement(r.290,p=0.000**) among the study group in post intervention phase ($p \leq 0.01$). This indicates that; students who developed stronger overall skills also became better at analyzing, evaluating, and synthesizing information, which are key aspects of critical thinking. Furthermore, became more competent in expressing ideas, listening, and collaborating with others, which are crucial for effective communication. These reveals that; the intervention provided a comprehensive approach that addressed multiple aspects of learning and skill development, including critical thinking, self-leadership, problem-solving, communication, and cognitive engagement. This holistic approach leads to strong correlations, as improvements in total skills would be reinforced by improvements in each of these specific areas.

Conclusion

The results of the present study, validated the research hypotheses, and demonstrated that TBL was more effective than traditional lecture-style method in improving the core competencies in terms of critical thinking ability, self-leadership, problem-solving ability, communication competence and cognitive engagement. For this reason, TBL is seen to be a helpful learning and teaching technique that can optimize the learning outcomes for maternity nursing students in their programs for women's health nursing care.

Recommendations

Based on the results of the present study, the researchers recommended the following;

1.Implement longitudinal studies to assess the long-term impact of TBL on students' clinical performance, retention of knowledge, and professional development after graduation.

2.Compare TBL with other active learning strategies such as problem-based learning (PBL), flipped classrooms, or simulation-based learning to identify which methods are most effective in enhancing core competencies and cognitive engagement in maternity nursing education.

3.Integrate TBL into the curriculum of maternity nursing courses as a core teaching strategy, supported by faculty development programs to train educators in effective TBL facilitation.

4.Encourage collaboration between nursing schools, clinical practice settings, and educational researchers to conduct multi-site studies on TBL's impact across different regions and educational systems.

References:

Alberti S., Motta P., Ferri P. & Bonetti L.,(2021): The effectiveness of team-based learning in nursing education: A systematic review. Nurse Educ. Today J.;97(1), 104721.

Annigeri ,*S.,S.,(2022):* Core competencies: significance in nursing, vol 5, no 1 DOI: https://doi.org/10.37628/ijebn.v5i1.2063

Baek KS, Kim JY.,(2016): The effect of team based child care simulation learning on critical thinking and problem solving ability. *J Korean Soc Multicult Health.* ;6(2):9–15.

Chandrasekharan, S., Sreedharan, J., & Gopakumar, A., (2019): Statistical issues in small and large sample: Need of optimum upper bound for the sample size. *International Journal of Computational & Theoretical Statistics*, *06*(02), 108-118. DOI:10.12785/ijcts/060201

Chen M., Ni C., Hu Y., Wang M., Liu L., Ji X. & Wang S., (2018): Meta-analysis on the effectiveness of team-based learning on medical education in China. BMC medical education J.;18(1), 1-

Choi E. H., (2016); Nursing competency and debriefing evaluation according to satisfaction in simulation practice. International Journal of Bio-Science and Bio-Technology, 8(2), 333–340. DOI:10.14257/ijbsbt.2016.8.2.31

Dearnley, C., Rhodes, C., Roberts, P., Williams, P. and Prenton, S., (2018): Team based learning in nursing and midwifery higher education; a systematic review of the evidence for change. *Nurse Education Today*, *60*, pp.75-83. DOI: 10.1016/j.nedt.2017.09.012.

Dubovi, A.,(2022): Cognitive and emotional engagement while learning with VR: The perspective of multimodal methodology. Computers & Education Volume 183, July 2022, 104495 https://doi.org/10.1016/j.compedu..104495

Durmaz C.; Serin K.; &Polat T., (2018): Determination of Problem-Solvingand Communication Skills of Nursing/Midwifery Students. International Journal of Caring Sciences, 11: (3) Pages 1771- 1777 Corpus ID: 204958973.

Espey, M., (2018): Enhancing critical thinking using team-based learning. *Higher Education Research & Development*, *37*(1), 15-29. https://doi.org/10.1080/07294360.2017.1344196

Hadie SNH., (2018): The Application of Learning Taxonomy in Anatomy Assessment in Medical School. Education in Medicine Journal.;10(1):13–23. https://doi.org/10.21315/ eimj2018.10.1.3

Haid, P., Levine, R. E., Parmeless, D. X., Crow, S., Kennedy, F., Kelly, P. A., I Richards, B. F. ,(2012): Perspective: Guidelines for reporting team-based learning activities in the medical and health sciences education literature. Academic Medicine, 87(3), 292Y299. DOI:10.1097/ACM.0b013e318244759e

Hailu, M., Welday, M., Haftu, A., Tadesse, D., Weldeamanel, T., Amsalu, B., Guta, A., Kassie, N., Sema, A., Mohammed, A. and Abdurashid, N., (2021): Clinical practice competence and its associated factors among midwifery and nursing students at dire dawa health sciences colleges, East Ethiopia,. *Advances in Medical Education and Practice*, 30:12:1539-1547. DOI: 10.2147/AMEP.S347080.

Hamada S., Haruta J., Maeno T., Maeno T., Suzuki H. & Takayashiki A.,(2020): Effectiveness of an inter-professional education program using team based learning for medical students: A randomized controlled trial. J Gen Fam Med; 21(1), 2–9. DOI: 10.1002/jgf2.284.

Hancock, G. R., & Mueller, R. O. ,(2001): Rethinking construct reliability within latent systems. In R. Cudeck, S. D. Toit, & D. Sörbom (Eds.), *Structural equation modeling: Present and future—a festschrift in honor of Karl Jöreskog* (pp. 195–216). Lincolnwood, IL: Scientific Software International.

Ho J M., Wong A Y., Schoeb V., Chan A S., Tang P M.& Wong F K.(2022): Interprofessional teambased learning: A qualitative study on the experiences of nursing and physiotherapy students. Front. Public Health J.; 9(706346),1-8. DOI: 10.3389/fpubh.2021.706346

Houghton J. D., Neck C. P., (2002): The revised self-leadership questionnaire: Testing a hierarchical factor structure for self-leadership. *Journal of Managerial Psychology*, 17(8), 672–691. DOI:10.1108/02683940210450484

Huang,G,C., Lindell,D., Lynn E Jaffe Amy M Sullivan,(2016):A multi-site study of strategies to teach critical thinking: 'why do you think that?'. Medical education J. ; 50(2), 236-249. DOI: 10.1111/medu.12937.

Huda, M., Teh, K. S. M., Muhamad, N. H. N., & Nasir, B. M., (2018): Transmitting leadership based civic responsibility: Insights from service learning. International Journal of Ethics and 34(1):20-31DOI: 10.1108/IJOES-05-2017-0079

Hur, G., (2003): "Construction and validation of a global interpersonal communication competence scale." Korean Journal of Journalism & Communication Studies 47.6: 380.

Hur, K. H., (2003): Construction and validation of a global interpersonal communication competence scale. Korean Journal of Journalism & Communication Studies, 47(6), 380Y408. (Original work published in Korean)

Ibrahim, I, Sleem, W., (2018): Team based learning: an innovative teaching strategy for enhancing students' engagement. *Innovation Education and Research Journal.* 6 (1),159. DOI: https://doi.org/10.31686/ijier.vol6.iss1.940

Jun HS, Ju HJ.,(2017): The effect of term based learning on communication ability, problem solving ability and self-directed learning in nursing science education. *J Digit Converg.* 2017;15(10):269–279. DOI: 10.14400/JDC..15.10.269.

Kim SM., (2019): Effects of team based learning on academic achievement, problem solving skill and communication ability in high risk pregnant nursing. *J Korea Acad Industr Coop Soc.* ;19(8):556–564. DOI: 10.5392/JKCA.2019.19.08.556

Kluwer,W., (2022):11 active learning strategies to engage active learning. Health

Lee , S., Kang, S.,(2021): The Effects of Team-Based Learning (TBL) Education on Critical Thinking, Interpersonal Relationships, Self-Leadership and Academic Major Satisfaction, Volume: 34, Issue: 4, Pages: 104-112 DOI: 10.16920/jeet/2021/v34i4/160693

Lee, K. E., (2018): Effects of team-based learning on the core competencies of nursing students: A quasi-experimental study. *Journal of Nursing Research, 26*(2), 88-96. DOI: 10.1097/jnr.0000000000000259.

Li Y, Wang X, Zhu XR, Zhu YX, Sun J. ,(2019): Effectiveness of problem-based learning on the professional communication competencies of nursing students and nurses: a systematic review. Nurse Educ Pract.;37:45–55.

Loseby, D., (2019): Critical thinking skills Available at: https://www.researchgate.net/publication/336058016_

Neck, C., Manz, C. & Houghton, J., (2020): Self-Leadership: The definitive guide to personal excellence, 2nd edn., Sage, Los Angeles, CA. ISBN-13 978-1506314464

Park, J. W., and O. H. Woo., (1999): "The effects of PBL (Problem-Based Learning) on problem solving process by learner's metacognitive level." *Journal of Educational Technology* 15.3: 55-81.

Perkmann,M., Salandra,R., Tartari,V., McKelvey,M., Hughes,A.,(2020): Academic engagement: A review of the literaturejournalhomepage:www.elsevier.com/ locate/respl https://doi.org/10.1016/J.respol.2020.1014114

Rotgans, J.I., Schmidt, H.G., Rajalingam, P., Hao, J.W.Y., Canning, C.A., Ferenczi, M.A. and Low-Beer, N., (2018): How cognitive engagement fluctuates during a team-based learning session and how it predicts academic achievement. Advances in Health Sciences Education, 23, pp.339-351. DOI: 10.1007/s10459-017-9801-2. Epub.

Rotgans, J.I., Schmidt, H.G., Rajalingam, P., Hao, J.W.Y., Canning, C.A., Ferenczi, M.A. and Low-Beer, N., (2018): How cognitive engagement fluctuates during a team-based learning session and how it predicts academic achievement. Advances in Health Sciences Education, 23, pp.339-351. DOI: 10.1007/s10459-017-9801-2.

Rubin, R. B., Graham, E. E., & Mignerey, J. T., (1990): A longitudinal study of college students' communication competence. *Communication Education, 39*(1), 1–14. https://doi.org/10.1080/03634529009378783

Sanad,A., Aida, El-SayedS., Hamdy, Bassuni, E., Ahmed,K., Eitayeb., (2023): Effect of Team Based Learning on Classroom Engagement, Critical thinking dispositions And Academic Achievement of Nursing Students Enrolled in Principle of Nursing Research Course, J Popul Ther Clin Pharmacol Vol 30(7):e222–e237;. DOI: 10.47750/jptcp.2023.30.07.027

Schraw, G., Flowerday, T., & Lehman, S., (2001): Increasing situational interest in the classroom. Educational Psychology Review, 13(3), 211–224. DOI: 10.1023/A:1016619705184

Shamsuddin, S., Amalina, Kasim, F., Mohammad, J., Al-Muhammady Yusoff, M., Saiful Bahri Hadie, S., Nurma Hanim, (2021): The Outcomes of Team-based Learning on Test Performance, Cognitive Engagement and

Motivation in Preclinical Anatomy Practical Classes Mal J Med Health Sci 17(2): 18-27

Shin, Y. K., Kim, M. S., & Han, Y. S., (2009): A study on the validation of the Korean version of the revised self-leadership questionnaire (RSLQ) for Korean college students. The Korean Journal of School Psychology, 6(3), 377Y393. DOI:10.16983/ kjsp.2009.6.3.377 (Original work published in Korean)

Torbjørnsen,A.,Elisabeth, H.,Karine,G., Bjørnnes, A., Kristin,(2021): Enhancing students learning experiences in nursing programmes: An integrated review 52(2):103038 DOI: 10.1016/j.nepr.2021.103038

Wang Y. L, Derakhshan A., Zhang L. J., (2021): Researching and practicing positive psychology in second/foreign language learning and teaching: the past, current status and future directions. *Front. Psychol.* 12, 731721. 10.3389/fpsyg.2021.731721

Wang Y., Derakhshan A., Azari Noughabi M., (2022a): The interplay of EFL teachers' immunity, work engagement, and psychological well-being: evidence from four Asian countries. *J. Multiling. Multicult. Dev*. 10.1080/01434632.2022.2092625

Weeks KW, Pontin D., (2020): Modelling the landscape of professional nursing competence - A global perspective. Nurse Educ Pract.;44:102738. DOI: 10.1016/j.nepr.2020.102738.

WHO.(2023): A woman dies every two minutes due to pregnancy or childbirth: UN agencies From Africa Renewal 23 February

Xiaoming, X., Ming, A., Su, H., Wo, W., Jianmei, C., Qi, Z., Hua, H., Xuemei, L., Lixia, W., Jun, C. and Lei, S., (2020): The psychological status of 8817 hospital workers during COVID-19 Epidemic: A cross-sectional study in Chongqing. *Journal of affective disorders*, *276*, pp.555-561. DOI: 10.1016/j.jad.2020.07.092

Yeung, M. M. Y., Yuen, J. W. M., Chen, J. M. T., & Lam, K. K. L. ,(2023): The efficacy of team-based learning in developing the generic capability of problem-solving ability and critical thinking skills in nursing education: A systematic review. *Nurse Education Today*, 105704. PMID: 36706730.
DOI: 10.1016/j.nedt.2022.105704

Yeung, M.M.Y., Yuen, J.W.M., Chen, J.M.T. and Lam, K.K.L., (2023): The efficacy of team-based learning in developing the generic capability of problem-solving ability and critical thinking skills in nursing education: A systematic review. *Nurse Educ Today . Mar:122:105704. DOI: 10.1016/j.nedt.2022.105704. Epub 2023 Jan 5.*

Yoon J., (2004): Development of an instrument for the measurement of critical thinking disposition: In nursing (Unpublished doctoral dissertation). The Catholic University, Korea. (Original work published in Korean)

Yoon JH, Lee EJ. ,(2017): The effect of team-based simulation learning on critical thinking, communication clarity, clinical performance ability and self-efficacy of nursing students. Korean J Women Health Nurs. 31; 27(4): 388–397.Published online 2021 Dec 15. DOI: 10.4069/kjwhn.2021.11.16