The Effect of Problem Based Learning VS Traditional Method on Innovation Skills among Students of Nursing Administration Course

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Abstract:

Background: Problem-based learning in educational practice that thoroughly had impact on all education levels due to the integration of acquired knowledge across disciplines in which it helps students to acquire knowledge and skills. The **aims** of the study were to determine the effect of problem based learning VS traditional method on innovation skills among nursing administration course students; and to identify the relationship between nursing administration course students' performance in problem-based learning and their innovation skills. **Research design**: a quasi- experimental research design. **Setting**: Faculty of Nursing, Minia University. Subjects: comprised of all 4th year (first subgroup of first term) during (2019-2020) who registered in Nursing Administration clinical course, total numbers (108) divided with systematic random sample into two equal groups as (54) for each group. **Results**: the students' total means score of innovation skills and all of its dimensions were higher in posttest than pretest among study group with significant difference; while no significant difference between pretest and posttest among control group. The innovation skills positively correlated to students' performance in problem based learning in first scenario and this correlation increased positively in second and third scenario **Conclusion**: The implementation of problem- based learning strategy among study group in nursing administration course help nursing students of fourth year to acquire innovation skills rather than the use of traditional method among control group. **Recommendation**: there is a need for implementing Problem –based learning as a dominant teaching strategy in nursing field for all academic years.

Key word: Problem-Based Learning, Traditional Method, Innovation Skills, Nursing Administration Course Students

Introduction:

It is a predominant outcome of clinical nursing education to get on well the professional and the cognitive skills among nursing students as well as developing their level of knowledge needed for increasing their life-long learning abilities. Also, nursing students are in a need to have more than normal cognitive skills, they need to develop higher cognitive skills as think innovatively and critically, and have creativity view to ensure that the future nurses will be able to be competent **(Aktaş& Karabulut, 2016)**.

Moreover, one of the vital specialties of Nursing Education is Nursing Administration field. The Nursing Administration Department has major and epoch-making responsibility

for the graduation and reinforcement a generation of nurses who master pivotal leadership roles and management functions. Thus, the nurse leaders and educators at all levels, at faculties or at health care setting, are in an indispensable positions to enactment their leaders' roles effectively as: problem solver, creative thinker, critical thinker, team player, conflict manger, change maker, effective communicator, technology master, decision maker, and innovator **(Clark, 2009; Ozturk & Muslu, 2008)**.

Therefore, for developing all theses previous skills among nurses, they have to be trained during their clinical academic practice; and to foster students to acquire these skills; they need to be learner not students. In traditional education, teaching is done to provide explanation, clarification, application and evaluation; this was not an effective manner to enhance higher cognitive skills for students **(Hsiao, 2003)**. Thus the use of innovative strategy can foster the students' higher cognitive skills **(Temel, 2014)**.

One of the ultimate widely used as an innovative teaching strategy is Problem-Based Learning (PBL) which is correlated to huge body of literature and firstly implemented in medical education **(Gul & Boman 2006; Opton, et al., 2014)**. PBL is an inquiry based innovative method which based and centered on student; and in which the students are guided to discover the optimal solutions of real-world problems by the utilization of cooperative work **(Oja, 2011)**.

Problem-based learning (PBL) is an instructional path that improves learners' sense of power to consolidate theory and practice, master the research, and stratify knowledge and skills to expand a viable solution for a problem **(Savery, 2006; Nariman & Chrispeels,**

2016). Also, the fulfillment of PBL can bridge theory-practice gap through fostering cooperation between student-teacher, and between student-students which has been confirmed that the relations in PBL are improved. PBL is a convenient method for students at numerous levels **(Martyn, et al., 2014; Moore, 2007)**.

Sequentially, using innovative PBL strategy can reinforce the establishment of higher cognitive skills levels as critical thinking, motivation, communication skills, clinical reasoning skills, problem solving skills, decision making skills, and innovation skills (Bradshaw & Lowenstein, 2014). Innovation is an activity process, as there is enforcement of a novel or purposefully amended design that need one to have commitment, sufficient resources and innovative climate within a place. Innovation seeks for good communication of interdisciplinary persons, using efficient methods, and sources of funding **(Jakovljevic, 2018)**.

Innovation is clearly a process that by cognitive ability one can draws on own experience and capabilities to interpret the acquired knowledge and ideas; and bring this ideas into something novel that will be appraised by others **(Banerjee, 2014)**. Innovation, like entrepreneurship, is a cognitive process that compromised the thoughts, related to feelings and ways of thinking which are expressed in an innovative behaviors or skills. Such socio-cognitive skills are sharped through experience and practice in an innovative environment; they are can be learnt skills in which by training and education the one can be innovator person **(Chell& Athayde, 2009)**.

There are many skills and behaviors in innovation that students should be trained and acquired it. The

initial skill in innovation is generating ideas which call for imagination as well as judgment if this idea represents an opportunity or not. Then there should be idea championing, and idea implementation **(Howell, et al., 2005; De Jong & Den Hartog, 2010)**.

Also, Innovators need to convince others with the own ideas in which these ideas are valued and should be supported; and this need self-efficacy and leadership skills. Also, when generating ideas one needs to have energy and creativity to generate new and novel ideas. Also, to become innovators, young student need an starting set of attributes and skills that are obviously emerged to the innovation process such as risk-propensity and future intention for developing career **(De Jong & Den Hartog, 2010; Chell& Athayde, 2009)**.

The study Significance:

Problem-based learning in educational practice stick around thoroughly impactful on all education levels due to the integration of acquired knowledge across disciplines in which it helps students enterprising in growing up their knowledge base and putting into service different and numerous sources of information **(Surur, et al., 2020)**. PBL encompass students' knowledge and skills determination to implement those skills in new situations or attain goals. PBL is an innovative strategy that foster critical thinking skills and problem-Solving abilities because students are actively participate in handling significant problems **(Yew & Goh, 2016)**

Furthermore, **Winarti and Waluya (2019)** had an research to investigate the impact of PBL on performance of student's to solve mathematical problem; and showed the average mean of student performance

before using PBL was 79 while after using PBL increased to 85 significantly. Also, **Tan (2003)** found that implementation of PBL manifest to be worthwhile in encouraging certain aspect of skills of innovation.

The majority of researches that were done to determine the effect of PBL were on critical thinking, problem solving, self-directed learning skills and the achievement of students while there is a need for further researches. In addition, there are limited studies which measure the effect of PBL on innovation skills. Therefore, the present study is unique and new in Egypt. It helps shed light on the effect of PBL strategy on the nurse students' innovation skills in Nursing Administration course.

Aims of the Study were to:

1.Determine the effect of problem based learning VS traditional method (presentation) on innovation skills among nursing administration course students

2.Identify the relationship between nursing administration course students' performance in problem-based learning and their innovation skills.

Research Hypothesis:

1) Students who are studied by problem –based learning will have higher mean score and level of innovation skills.

2) Students who have high performance in problem-based learning will manifested by high score of innovation skills.

Subjects and Methods

Design of present research:

The present study had a quasi-experimental research design to assess the research hypothesis.

Setting:

The study was carried out at two setting: first Faculty of Nursing at Minia University. Faculty of Nursing at Minia University which was established in 1995, and accredited in 2019; and faculty include six scientific departments. Second setting was clinical training setting that included the teaching classrooms in three hospitals namely: "Minia University Hospital"; "Gynecology, Obstetric and Pediatric Minia University Hospital" and "Renal and Urology Minia university hospital".

Subjects:

The subjects have been comprised of all 4th year (first subgroup of first term) during (2019-2020) who registered in nursing administration clinical course, at Nursing Administration Department, Faculty of Nursing, Minia University. The total numbers of the students was (108) divided with systematic random sample into two equal groups as (54) for the study group and (54) for the control group.

Tools:

Two tools were employed to collect data as follows:

Tool I: Nursing Student's Innovation Skills questionnaire (NSIS): This tool included two portions

Portion one: this was included the nursing students personal data as (age, gender, residence, and last academic achievement)

Portion two was originated by researchers based on the work of **De Jong (2007)**; **De Jong and Den Hartog (2010)**; and **Chell and Athayde (2009)** to assess nursing students innovation skills. It created to include 58 items to measure ten dimensions of innovation skills as: Idea generation (6 items), Idea championing (6 items), Idea implementation (4 items), Enjoying environment (6 items), Creativity (6 items), Leadership (6 items), Energy (7 items), Self-efficacy (8 items), Risk-propensity (4 items), and Future Intentions (5 items).

Each items was measured by 7 point likert scale ranged from strongly disagree =1 to strongly agree=7. The scoring system for total innovation skills ranged from 58 to 406 distributed as follows:

❖   From 58 to 174 pointed out low innovation skills

❖   From 175 to 290 pointed out moderate innovation skills

❖   From 291 to 406 pointed out high innovation skills

Tool II: Nursing Student's Performance in PBL Scale:

This tool was established by **Valle et al (1999)** and it was adopted by the researchers to evaluate the performance of nursing administration students in PBL. This tool formulated from 24 items and measured on six points likert scale which have the ranged from "never (1) to always (6)". The tool have been composed four dimensions that named: the independent study included (9 items); the group interaction included (5 items); the reasoning skill included (6 items); and finally the active participation included (4 items). The scoring system for total

performance in PBL ranged from 24 to 144 distributed as follows:

❖   From 24 to 63 pointed out low PBL performance

❖   From 64 to 103 pointed out moderate PBL performance

❖   From 104 to 144 pointed out high PBL performance.

Validity and reliability of the study tools

Validity: the study face and content validity was examined by a panel of five experts in Nursing Administration field. The recommended modifications were finished to hold out the final version of tools. The tools conceived to be valid from the experts' standpoint.

Reliability: the researcher test reliability by Cronbach's Alpha test; and tools internal consistency was determined; for tool one "Nursing Student's Innovation Skills scale" was ($\alpha = 0.77$); and for tool two "Nursing Student's Performance in PBL" was ($\alpha = 0.90$); and this indicated that tools had acceptable level of reliability.

Ethical Considerations:

Formed approval to conduct the study was gained from the Faculty Dean of Nursing at Minia University as well as the Vice Dean for Education and Students Affairs. Also, permission from head of Nursing Administration department was obtained. Oral permission was obtained from nursing students after study aims were explored, and assure for them the anonymity, confidentiality, and privacy; as well as their data will be utilized in a secret manner for the purpose of the study. Also, assured for them that there is no constrains for their withdrawal from the study. This was go ahead by their contract on the study.

Pilot Study:

To assess the study tools visibility, intelligibility and practicality; a pilot study was done on 10 % of 4th year nursing students (11 students) who enrolled at the time of data collection in clinical psychiatric course. Also, the applicability of pilot study was to approximate the required time from students for filling the tools. The time required to fill tool one was about 15 to 20 minutes and for tool two and was about 5-10 minutes. The pilot study was excluded from the study results.

Study procedures:

1.Written official permissions were taken to implement the study from administrative authorities.

2.Tools one developed by the researchers after the review of related literature and it was assessed by a jury of five experts. And tool two was adopted.

3.Validity and reliability of study tools were assured

4.A pilot study on 11 students was done and it was not included to total number of the students.

5.Nursing students in Nursing administration clinical course were divided randomly into two groups (54) students in the study group and (54) in the control group.

For the Study group:

The actual study was conducted in three phases: designing, conduction, and evaluation phase.

1.Phase (I) Designing was included the following stages

a.Preparation of tools based on related literature, and assessing its validity and reliability; this took from researcher about 3 months.

b.Development of PBL scenarios: five PBL scenarios related to Nursing Administration topics were choose and developed as (time management, decision making, leadership, turnover, organizational commitment) based on textbooks and electronic resources.

c.Pre-test for the study group using tool one was done.

d.Preparation of learning environments: the learning environment in which the study was conducted, and all needed resources were prepared

e.Preparation of students: the students in the study group (54 students) were divided by (systematic random sample) into seven sub-groups (five groups comprised eight students and two groups comprised 7 students).

f. Training of students: The students were trained to the PBL technique and by using two PBL scenarios (turnover problem and organizational commitment problem). Each PBL scenario took one week, scenario lasted for three sessions; every session lasted for about 3 hours. Assessment of students' performance in PBL was done by researchers and feedback was given to students after the two initial scenarios.

2.Conduction phase was conducted by using three PBL scenarios. It lasted for three weeks; as one problem every week (time management, decision making, and leadership respectively). The

three scenarios were specified to each sub-group. Each scenario lasted for three sessions; the session lasted for about 2 hours. The students' performance in PBL was done by researchers at the end of each scenario.

3.Evaluation phase: post-test was done using tool one after the third scenario; in the six week.

For the control group:

a) The researchers explained the aims of the study for the students and assured its confidentiality, anonymity and privacy.

b) Pre-test for the control group using tool one was done.

c) Preparation of students: the students in the study group (54 students) were divided by (systematic random sample) into seven sub-groups (five groups comprised eight students and two groups comprised 7 students).

d) Distribution of topics for the groups using traditional clinical assignment (presentation technique).

e) Posttest was done after the implementation of students presentation for selected topics in the six week

The researchers' roles in all PBL tutorials were as follows:

▪ Smoothing and managing the group dynamic of all sub-groups.

▪ Securing that students understood the objectives of PBL sessions

▪ Supporting students to understand their roles and encouraging them to change their roles with each scenario.

▪ Monitoring, listening, activating, and supporting the students' participation in PBL sessions.

Limitation of the study:

▪ There was some limitation regarding environment as the classroom in the faculty didn't permit to each group to have a classroom because of the other academic years students existence at faculty; in which the researchers have some groups to made their interview sessions at their nursing administration department offices.

▪ Also, in Hospitals there was many time that the hospital worker close the classrooms early, which put extra effort on students and researchers to return to faculty after clinical training day and starting their session in faculty classrooms.

Statistical Analysis

After data were collected it was checked out, coded and fed to statistical software SPSS version 25. The given graphs were created using Microsoft Excel software. All statistical analysis was done using two tailed tests and alpha error of 0.05. P value less than or equal to 0.05 is considered to be significant. The following statistical tests were used: frequency, percentage distribution; mean and standard deviation were implemented. Comparison was performed using, T-test, Z-test, Mont Carlo exact test, ANOVA test. Correlation between variables was evaluated using Pearson's correlation coefficient (r).

Results:

Table (1) shows that (90.7% and 85.2% respectively) of nursing administration course students among study and control groups aged 21 years old with mean age (21.00+0.306) for the study, and mean age (21.00+0.348) for the control. As regards last academic achievement there was (16.6%) of the study group and control group had excellent appreciation. **Figure (1)** displays regarding gender that (59.3%) of the study group and (63%) of the control groups are female; concerning the residence, it notes that (75.9% and 61.1% respectively) in both the study and control groups are live in rural area.

Table (2) explains before using PBL, that nursing students in administration course had low innovation skills in both the study and control groups (51.9% and 50% respectively) with no significance between the study and control groups (P=1.000) before intervention. While after the intervention, the students in study group had a high score (75.9%) of innovation skills compared to (22.2%) students in control group with highly significance differences between the study and control groups (P=0.001). Moreover, there was statistically significant difference before and after intervention among the study group (P=0.001), while there was no statistically significant difference between before and after intervention among the control group (P=0.157).

Table (3) explores that nursing students in nursing administration course had low mean score for all dimensions of innovation skills among the study and control groups; as well as they had low total mean score of innovative behaviors before the intervention; with no statistically significant differences between the study and control groups.

Table (4) shows nursing students of the study group had high mean scores for all dimensions of innovation skills after the intervention compared with mean scores of control groups with

statistically significant differences between the study and control groups after intervention (P=0.001) for all dimensions. Also, the study total mean score after intervention was high (318.94+ 97.15) while control group mean score was (205.74+ 104.70) with statistically significant differences between the study and control (P=0.001).

Table (5) illustrates that the mean scores of the nursing students' performance in PBL among study group was high after the third scenario than the second and third scenarios with statistically significant differences for all dimensions expect independent study dimension (p=0.046). Also, the total mean score of overall performance in PBL among study group nursing students was high after the third scenario than the second and third scenarios with statistically significant differences (P=0.021).

Table (6) implies that there is significant correlation between nursing student performance in PBL for the first, second and third scenario and their innovation skills after intervention behaviors nursing students after in the study group; as the (r) value in first scenario was (0.645) and in second was (0.720) and increased in third scenario (0.792) with P value (0.001) for all scenarios.

Table (7) illustrates relation between innovation skills of fourth year nursing students after intervention and personal data in the study; there is statistically significant difference between innovation skills with gender (p=0.001) and with last academic achievement (0.001). While, there is no statistically significant difference between innovation skills and residence and age.

Table (1) Distribution of the fourth year nursing students personal data (n=108)

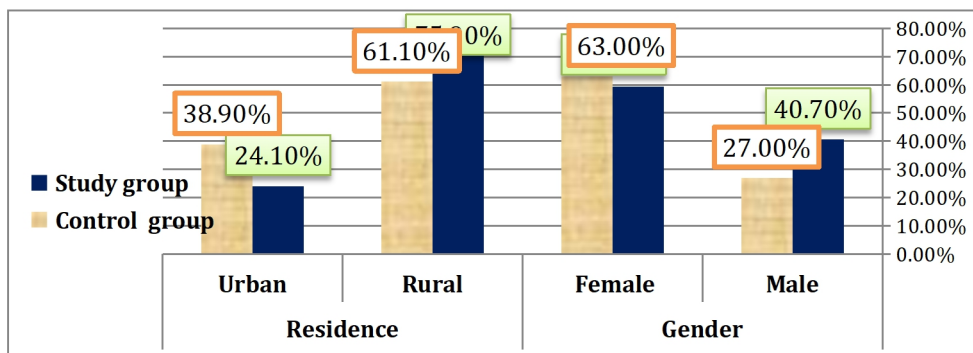| Personal data	Study group (n=54)		Control group (n=54)	
	no	**%**	**no**	**%**
Age				
● **20**	3	5.6	4	7.4
● **21**	49	90.7	46	85.2
● **>21**	2	3.7	4	7.4
Mean +SD	21.00+0.306		21.00+0.348	
Last academic achievement				
● **Fair**	15	27.8	17	31.5
● **Good**	15	27.8	11	20.4
● **Very good**	15	27.8	17	31.5
● **Excellent**	9	16.6	9	16.6

Figure (1) the Distribution of the fourth year nursing students regarding their residence and gender (n=108)

Table (2) Distribution of the innovation skills of fourth year nursing students in administration course among the study and control groups before and after intervention

Innovation skills of nursing students	Groups				MCP (P-value)
	Study (N=54)		Control (N=54)		
	No	%	No	%	
Before intervention					
▪ Low	28	51.9	27	50	0.094
▪ Moderate	14	25.9	15	27.8	(1.000)NS
▪ High	12	22.2	12	22.2	
After intervention					
▪ Low	5	9.3	25	46.3	32.225
▪ Moderate	8	14.8	17	31.5	(0.001**)
▪ High	41	75.9	12	22.2	
Z – test (p-value)	5.488 (0.001**)		1.414 (0.157NS)		

Table (3) Mean scores of innovation skills dimensions among the study and control groups students before intervention

Dimensions of Innovation skills among nursing students	Two groups before intervention (n=108)				T test (P)
	Study group (N=54)		Control group (N=54)		
	Mean	SD	Mean	SD	
● Idea generation	20.05	11.45	20.88	11.32	0.705NS
● Idea championing	19.98	11.31	20.81	11.19	0.701 NS
● Idea implementation	14.75	7.87	15.29	7.71	0.721 NS
● Enjoying environment	20.14	11.52	20.98	11.38	0.706 NS
● Creativity	20.05	11.45	20.88	11.32	0.705 NS
● Leadership	20.05	11.45	20.88	11.32	0.705 NS
● Energy	22.48	13.15	23.46	13.06	0.698 NS
● Self-efficacy	24.88	14.59	26.01	14.53	0.688 NS
● Risk-propensity	14.70	7.87	15.24	7.71	0.721 NS
● Future Intentions	16.38	9.62	17.03	9.52	0.726 NS
Total innovation skills	193.51	109.85	201.51	108.61	0.704 NS

Table (4) Mean scores for innovative behaviors of fourth year nursing students among the study and control groups after intervention

Dimensions of Innovation skills among nursing students	Two groups after intervention (n=108)				T test (P)
	Study group (N=54)		Control (N=54)		
	Mean	SD	Mean	SD	0.001**
● Idea generation	33.16	10.13	21.37	10.89	0.001**
● Idea championing	32.75	9.83	21.31	10.79	0.001**
● Idea implementation	23.35	6.84	15.55	7.59	0.001**
● Enjoying environment	33.18	10.12	21.46	10.95	0.001**
● Creativity	33.16	10.13	21.37	10.89	0.001**
● Leadership	33.16	10.13	21.37	10.89	0.001**
● Energy	37.50	11.36	24.18	12.48	0.001**
● Self-efficacy	41.20	12.22	26.85	13.75	0.001**
● Risk-propensity	23.35	6.84	15.55	7.59	0.001**
● Future Intentions	28.09	9.76	16.70	9.26	0.001**
Total innovation skills	318.94	97.15	205.74	104.70	0.001**

Table (5) Mean scores for problem-based learning performance after intervention in the study group

Dimensions of PBL Performance	Study group performance in PBL scenarios (n=54)						F (P)
	After 1st scenario		After 2nd scenario		After 3rd scenario		
	Mean	SD	Mean	SD	Mean	SD	
Independent study	29.42	11.31	31.98	11.86	34.50	12.27	2.897 (0.046)
Group interaction	16.42	7.13	18.24	7.56	19.96	7.35	3.014 (0.032)*
Reasoning skills	23.81	5.41	25.44	5.82	27.20	5.73	4.841 (0.009)*
Active participation	13.53	5.38	14.40	6.004	15.51	5.94	2.598 (0.052)*
Overall performance	83.20	27.69	90.074	30.001	97.18	30.62	3.039 (0.021)*

Table (6) correlation between problem-based learning performance for three scenarios and innovative behaviors of nursing students after intervention among the study group

		Performance of study group in Problem-based learning (n=54)		
		After 1st scenario	After 2nd scenario	After 3rd scenario
Innovation skills of nursing students after intervention	r	0.645**	0.720**	0.792**
	P	0.001	0.001	0.001

Table (7) Relation between innovation skills of students in nursing administration course after intervention and their personal data in the study

Personal data	Innovation skills among Study group (n=54)						MCP P-value
	Low (n=5)		Moderate (n=8)		High (n=41)		
	no	%	no	%	no	%	
Age							
• 20	0	0	0	0	3	100	1.268
• 21	5	10.2	8	16.4	36	73.4	1.000NS
• >21	0	0	0	0	2	100	
Gender							
• Male	5	22.7	0	0	17	77.3	12.846
• Female	0	0	8	25	24	75	0.001**
Last academic achievement							
• Fair	5	33.3	8	53.4	2	13.3	
• Good	0	0	0	0	15	100	36.161
• Very good	0	0	0	0	15	100	0.001**
• Excellent	0	0	0	0	9	100	
Residence							
• Rural	5	12.2	8	19.5	28	68.3	4.593
• Urban	0	0	0	0	13	100	0.079NS

Discussion:

Nowadays, communities asking for more matured nursing students who have higher and super capabilities to communicate, cooperate, create, collaborate, solve problems, think creatively, think critically, make effective decisions, and think with innovations. Thus, educators of nursing career have a pressure to continue improve themselves and use new innovative teaching strategies that make greater emphasis on fostering student's higher cognitive skills **(Henry, 2005)**.

One of the optimum vital innovative teaching strategies that can enrich nursing students' higher cognitive skills as solving problem, think critically, leading nursing, supervising staff, providing new creative ideas, and making decision is the use of problem based learning (PBL). PBL is learning method that dependent mainly on students as learning take place in small groups of students, and students directed themselves by some assistance from instructors who had role as facilitators **(Chan, et al., 2015; Swan, et al., 2013; Baker, et al. 2007)**.

The existing study results showed regarding nursing student personal data in administration course that majority of nursing administration course among students study and control groups aged 20 years old. As regards last academic achievement the lowest percentage of them at study group and control group had excellent appreciation. Also, regarding gender highest percentage of the study group and the control groups were female; concerning the residence, it was mentioned that highest percentage of them in both the study and control groups are living in rural area.

Moreover, this study revealed before using PBL, that highest percentage of nursing students in administration course had low innovation skills in both the study and control groups with no significance between the study and control groups before intervention. While after the intervention, the students in study group had a higher score level of innovation skills compared to low percent

of students in control group with highly significance differences between the study and control groups. Moreover, there was statistically significant difference before and after intervention among the study group, while there was no statistically significant difference between before and after intervention among the control group.

These results were predictable because the pre-test assessment of innovation skills was accomplished at the onset of first semester of 4th academic year in which all nursing students in the study and control group have no experiences for using PBL strategy in which they had no idea about what is PBL process, its uses, and benefits; as well as they had no knowledge about innovations skills.

Also, these results can be explained that after applying PBL strategy, the students can acquired more cognitive skill as innovation skills; which were proved as the majority of the study group students had high scores of innovation skills after applying PBL rather than the control group. While, the highest percentage of the control group students had moderate scores and no significance changing or improving in control group innovation skills after using traditional method (presentation technique).

These results may be due to application of PBL steps, in which it stimulates students to participate and work in small groups consisting of 8 students for the group. Working in small groups have been proved to encourage students to share their knowledge, ideas, and thinking with other partner of students. In PBL the students depending on own self began to recognize the problem, investigate and seeking for information that will come to the aid of them in solving problem, collaborated and studying the available options and solution, then solved problems with each other.

In addition, applying PBL process can give assistance to students to take more points of view from their students' peers. Also, in PBL they work independently and with the direction of their instructors and researchers, who was available all time, to answer their requests, prompting and motivating them to do their greatest effort, underpinning and fostering their performance, and amending their misunderstanding.

There was no study the measure effect of using PBL on students' innovation skills till now; however, these results were in line with **Hoidn and Kärkkäinen (2014)** who mentioned that at the medicine profession field the use of PBL appears to be valuable in boosting many aspects of skills for innovation. Specially; PBL have benefits in developing long-term retention and knowledge implementation, evolving cognitive thinking and creativity skills, in addition improve students' social and behavioral skills (e.g. motivation, problem-solving, self-confidence, critical thinking skills, self-efficacy, creativity, risk taking, and team work).

Therefore, the application of PBL can help student of nursing profession to acquire higher levels of cognitive skills and behaviors; and this was approved with studies. For example **Nango and Tanka (2010)** assessed clinical decision making among medical profession students by applying PBL programs and found significant change among students' for their clinical decision making. Also, **Thabet et al., (2017)** found a significant change of the study group decision making skill than the control group.

Furthermore, **Abd El-Hay and Abd-Allah (2015)** confirmed that there was an improvement among nursing students in their problem solving skills, participation, communication, and decision making skills after the application of PBL strategy. Moreover**, Al-Dress et al. (2015)** assured that PBL application foster and support students to promote their decision making skills, and collaborative learning.

In the same context of using innovative teaching strategy **Barak and Yuan (2021)** had a study to assessed innovation thinking and their results indicated that using innovative methods process had a positive impact on growing students' innovative thinking in both groups,

Regarding dimensions of innovation skills: this study results explored that nursing students in nursing administration course had low mean score for all dimensions of innovation skills among the study and control groups; as well as they had low total mean score of innovative behaviors before the intervention; with no significance.

This result was expected due to poor knowledge of nursing students regarding innovation skills as well as they still in need for more topics regarding innovation as leadership, creativity, authentic, self- confidence, self-efficacy, risk take, feeling with power and energy, time management, delegation, self-discipline, and abilities of good supervisor; in which they will study these topics during their 4th year in the Nursing Administration and Psychiatric Nursing courses

In addition, the current results showed that nursing students of the study group had a high mean scores for all dimensions of innovation skills (Idea generation, Idea championing, Idea implementation, Enjoying environment, Creativity, Leadership, Energy, Self-efficacy, Risk-propensity, and Future Intentions) after the intervention compared with mean scores of control groups with statistically significant differences between the study and control groups after intervention for all dimensions. Also, the study total mean score after intervention was high; while control group mean score was low with statistically significant differences between the study and control.

From our stand point; these results were expected due to the implementation of PBL in the study group; PBL is an inquiry based and innovative teaching strategy in which it has several step that help student centrally depended on his/her-self and with the guidance from facilitators and group member reach to problem solution through cooperation, communication, using critical thinking, brainstorming and generate new ideas, determine alternatives, investigate alternatives, and solve problem.

This explanation support by **Oja (2011)**, who agreed that PBL is inquiry based and student-centered innovative strategy, in which it provide lines for students to found suitable and best solutions of real problems during a process of cooperative group work and critical thinking skills.

Also, from view of points the process of PBL has several steps and these steps will foster student innovation skills as: firstly, students are confronted with a problem scenario. Secondly, students deliberate about the problem with their small group member in PBL tutorial crystallize the issues from problem scenario, locate what is the problem, brainstorm and generate ideas based on the preliminary knowledge.

Also, they realize their needs and requirement to single out on the problem, recognize what their weakness knowledge, and appoint an action plan for functioning on the problem.

Thirdly, students immersed in an independent study by using their learning aspects outside the tutorial. They can search for information sources and design the need information through using library, the web, databases, and resource people. Fourthly, they regain to their PBL tutorial (s) for information partnership, peer instruction and laboring with their small group member on the problem to have action plan. Fifthly, they attended and explain their findings and solutions to the problem. Finally, they analyze what they have acquired from functioning with other to solve the problem. All of these PBL process steps supported with **Weshah (2012) and Barrett (2005).**

Therefore, by applying these steps in PBL process the students can acquire the innovations skills. For **idea generation dimension**; in the step two of PBL process the student has to generate new ideas and solutions to problem which are one of innovation skills in our study. This supported with **Barak and Yuan (2021)** who assessed innovation thinking skills by using innovative teaching method and mentioned that using this innovative method will help students to improve their behaviors regarding the idea generation of innovation skills such as the behaviors of observing and questioning, and idea networking.

Moreover, for **idea championing dimension** from our perspective, when students use PBL steps, they create new issues and solutions for the problem as well the students are divided to small groups and in the end session each group come to classroom and present their ideas and advocate for theses idea in front of

other groups which was done in step five, in which it means that they working in PBL can encourage student to advocate and champion for their idea.

In addition, for **idea implementation dimension** by implementing PBL process, as ask for information, seek for instruction and put action plan to solve problem they create new issues and solutions for the problem as well the put the action plan for the problem as in step four, they then implement what they search for and learn into actual points. Also, the student by practicing with problem solving in PBL discover his weakness and began to change himself or herself which mean implement new methods of learning to acquire more skills.

Yew and Schmidt, (2011) illustrated that students when using PBL, based on cognitive theory, can reinforce their idea implementation and induced it to reality; as they come/ get together information, shape hypotheses, and manufacture decisions by using the cognitive framework; and then implement those ideas as they forward in the their study.

For **enjoying environment dimension**; the PBL process is implement in small groups of students who meets with each other continuously to solve problem, they feel as they not structure classroom but work with joyfulness and fun environment. In PBL they enjoy learning about many topics as well search for learning information even when they are not in University. Also, students in PBL have to work with their peers in the group and communicate with other groups and this environment of participation and sharing improve feeling of enjoying environment

This was supported by **Kuoa et al., (2019)** who mentioned that joyfulness of learning environment had positive score among participants as students asked about their perception about learning in PBL and its content and they mention that PBL is joyful and enjoying environment for them; and that post-test mean score of joyfulness was increased after using PBL among engineering students. Also, **Hoon and Amin (2009)** mentioned that PBL can foster students to meet these needs of basic learning as fun and enjoyment which was frequently associated as outcomes of PBL.

Also, **concerning Creativity dimension**; the PBL process is help student to create new ideas and solutions to reach to the best solutions for the problem; and the dynamic of groups working and competition for which group will find best solution encourage them to create new concept.

The ability to create new idea that is innovative cannot be only the start important step in the innovation process, but it also requires the skills of imagination and creativity. Imagination considered being the ability of person to visualize the improvement of the idea into the future. Creativity includes imagination and the ability to correlate ideas, to gear and solve problems, and inquisitiveness. There is unanimity that creativity is a fundamental base of innovation **(Chell & Athayde, 2009)**.

According to **West, (2002)** creativity could be cornerstone of innovative behaviors in the work, as one should be clear at the starting point of the innovation especially when performance gaps of problems or are raised; and ideas should be generated within a creativity manner to find solution for problems and decrease performance gap. Also, **Kuoa et al., (2019)** found the student's scores on

the four creativity aspects were switched into higher scores, and overall creativity indicated that student's overall creativity was get better in posttest than pretest of implementing PBL.

Ulger (2018) added that findings from his study indicated that the PBL method provide a positive significant influence on students' thinking of creativity. Also, **Ulger and Imer (2013)** displayed that using PBL method can induced an important significant impact on students for their creative thinking abilities. And, **Orozco and Yangco (2016)** agreed in their study that students who applied PBL directions had more mean scores in posttest for creative thinking skills test in Biology than students who had no PBL directions.

Also, **concerning Leadership dimension**; in PBL process every student have a role and they interchange these roles in each scenario; they have roles of facilitator, recorder, team tutor, leader, liaison, and researcher. Thus, in PBL the student can learn how a leader be and lead his or her group effectively and this consequently improve their leadership abilities.

This is in line with **Edwin and Philip (1995)** mentioned that by using PBL students in educational administration classes can acquire current principals of management skills and learn leadership skills by encouraging collaboration, communication, cooperation and building agreement.

In this context; **Chell and Athayde (2009)** mentioned that the use of an innovative process, required a leader who communicate effectively thoughts to other vision, fascinating them of own idea quality and potential, and accompany peer ideas; as well as in PBL the students have to share their ideas with other and

persuade them; helping others and providing support to other peers in which encourage sense of leadership.

Also, **concerning Energy dimension**, student in PBL have to meet with their groups frequently, search for knowledge, have brainstorming to generate new idea, share with peers the ideas, as well as share with other groups. So, all of these activities can encourage students to feel energetic more than traditional teaching method.

This result supported with **Norfarah, et al., (2017)** illustrated in their study which involved forty eight Malaysian secondary school students and compared energy conservation scores between students' behavior before and after using PBL; that score of students' behavior regarding energy increased after the use of PBL. Also, **Subramaniam (2006)** mentioned that process of PBL will do through reciprocal interaction and participated understanding; and this sequentially, can improve students feeling with energy. Also, **Hoon and Amin (2009)** agreed that based on theory of control which used in PBL that all students can have the basic requirements for learning as freedom, power, love and belonging, energy, fun, and existence and reproduction

Furthermore, **concerning Self-efficacy dimension**, PBL asked student to work independently and this required them to have self-efficacy. Also, the specific strategies that implemented in PBL as the use of actual problems of nursing practice, collaboration and cooperation, and reflection; are all core aspects in the catalyst for students' to enhance their self-efficacy.

Also, this result was in line with **Dunlap (2005)** who confirmed that learning (PBL) helping students gain the knowledge and skills that required in the workplace as well as they required the skill of self-efficacy to perform well in their workplace. And there was thirty one students have higher level of self-efficacy after using PBL. Also, this supported by **Kuoa et al., (2019)** who proved in their study that students asked questions regarding their self-efficacy and found that students have great self-efficacy in the final posttest.

Concerning risk-propensity dimension, from our view, PBL is an inquiry based learning that involve searching for information and asking questions; and asking questions involves taking risks. Also, in PBL the mistakes are accepted which encourage risk take and falls with no punishment, there are many answer of questions and sharing for all idea which encourage students to be risk taker as the instructors will listen to all students and accepts their answers of problem.

Furthermore, **concerning Future Intentions dimension**; **Kuoa et al., (2019)** mentioned that innovation teaching strategy have a growing value for students future intention; as the students future career development was higher in posttest in comparison to the results of Pretest. This can be explored as most students in processing PBL were well-knowledgeable and oriented to significance of the interdisciplinary skills and knowledge, as well as the student become more collaborated and have good intentions for their future career.

Regarding performance in PBL: Current study illustrated that the mean scores of the nursing students' performance in PBL among study group was high after the third scenario than the second and third scenarios with statistically significant differences for total overall performance and for all

dimensions expect independent study dimension.

These study findings may be attributed due to the fact that applying the first PBL scenario with extensive guidance from researchers and clinical instructors to help student to be aware of PBL process and their expected roles. Students had low mean score in first scenario due to poor experiences with PBL then this mean score increased for all dimensions (Independent study, Group interaction, Reasoning skills, and Active participation) as well as the total overall score knowledge in the selected topics scenario (time management, Decision making, and Leadership). Therefore, after performing steps through the process of PBL (setting goals, defining problem, searching for sources of information, determining solutions and finally choosing the best one) three times by three scenarios developed, the students awareness of PBL performance were enhanced and improved gradually and they became more expert in implementing PBL process.

This interpretation was in the same line with **Valle et al. (1999)** who found significant statistical correlation and relations in students' scores among independent study, group interaction, reasoning skills, and active participation in PBL performance.

This was in same line with the interpretation of **Tseng et al. (2006)** who discussed that PBL process developing awareness of students' performance in PBL. As well, they found that students in study group had a higher score in their PBL performance in the post-test. In addition to study done by **Alghasham (2012)** and who mentioned that there is significance found in students' performance in PBL for four out of the

five PBL sessions that evaluated by their investigators.

Moreover, form researchers perspectives these results can be due to the consistent and direct observation as well the instructions that was given to the students during their performance in PBL process by the researchers. The researchers guided and directed students' performance in PBL in which there were two scenarios from five selected scenarios that students have training on it and researchers provided performance feedback to students in order to correct their performance; and researchers reinforced their correct performance, corrected their mistakes and performance, and encouraged them to be aware of their strong and weak points. Furthermore, PBL performance sheet was illustrated to the students before the first scenario by the researchers and students have the two copy of their performance sheet regarding the two scenario of training before actual measuring of their performance in PBL.

This interpretation was in line with **Bergmann et al. (2007)**, who agreed that when providing the students a copy of PBL process assessment sheet, their performance will be improved and positive outcomes will be founded. Also, **Lipnevich and Smith (2009)** confirmed that descriptive feedback about students' performance sheet at the beginning of PBL implementation had positive impact on their performance in PBL.

For the correlation/ relations: the current study results implied that there is significant correlation between nursing student performance in PBL for the first, second and third scenario and their innovation skills after intervention in the study group; as significant increase of (r) value from first to second and final third scenarios. This result may be due to applying the process of PBL which

includes several steps that foster innovation skills dimensions as previously discussed.

In addition, the study results revealed significant relations between innovation skills of fourth year nursing students after intervention and personal data in the study and control groups. Regarding the students in study group, there is statistically significant difference between innovation skills with gender and with last academic achievement. As for the gender the highest percentage of female and male student who had high level of innovation skills; but significance is founded due to one quarter of female had moderate level of innovation skills while one quarter of male had low level of innovation skills; and this indicated that female nursing students had higher score for innovations skills than male students; this can be explained due to the interest of female is differ than male as female have interest in their study courses than male students.

Regarding last academic achievement, it was noted that all students who had good, very good, or excellent achievement had higher level of innovation skills than students had fair, this is expected because student higher achievement the higher ability to acquire innovation skills.

Finally, in this context, PBL provides an attractive teaching and learning than traditional approaches by strolling the emphasis from what is educated to what the student learns. PBL is designed to foster many aspects among students as transferable skills, critical thinking, self-discipline, self-efficacy, creativity, diversity thinking, decision making, motivation, communication, leadership skills, future development, risk talking, team work, information retention, information processing, clinical reasoning,

independent work, active participation, group dynamics, and innovations. Despite the favorable evidence that confirmed the positive effect of using problem-based learning in higher education regarding different aspects of skills for innovation, there is a need for more investigations and researches to be implemented in this area.

Conclusion:

The current study come to an end that the implementation of problem-based learning strategy among study group in nursing administration course help nursing students of fourth year to acquire innovation skills rather than the use of traditional method (presentation) among control group in which their innovation skills increased but with no significance. Also, current study culminated that study group students had higher mean score for all dimensions of innovation skills (Idea generation, Idea championing, Idea implementation, Enjoying environment, Creativity, Leadership, Energy, Self-efficacy, Risk-propensity, and Future Intentions) after implementing problem based learning than control group. The innovation skills positively correlated to students' performance in problem based learning in first scenario and this correlation increased positively in second and third scenario.

Recommendations:

Based on current findings; there is a need for implementing Problem –based learning as a dominant teaching strategy in nursing field for all academic years. There should be continuous application of PBL in nursing administration course. For further research; it is recommended to re-implement the study in different settings and with different course of nursing field to assure its applicability on innovation

skills among students. Comparison between PBL and self-directed learning on students' innovation and critical thinking skills.

Conflict of interest

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