Effect of Problem Based Learning on Self Directed Learning and Critical Thinking dispositions among Faculty Nursing Students

Zagazig University

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Abstract

Background: Problem-based learning is one of the most important developments in health education. This educational strategy uses real problems as a context for students to learn and has been chosen for curriculum delivery in many professional schools around the world. **Aim of the study:** was to evaluate the effect of problem based learning on self-directed learning and critical thinking among nursing students. **Subjects and Methods: Research design:** A True experimental design was utilized. **Setting:** The study was conducted at faculty of nursing Zagazig University. **Subjects:** simple random sample of 192 students were chosen divided into 96 for experimental group and 96 for control group.**Tools of data collection:** a questionnaire sheet for student nurses composed of six parts: personal characteristics, Self-directed learning skills, Self-directed learning readiness, Knowledge Test, the California critical thinking disposition, and self- assessment and tutor assessment. **Results:** revealed that there were statistically significant improvements regarding the self-directed learning skills in experimental group than in control group. As well, there were statistically significant improvements regarding the self-directed learning readiness in experimental group than in control group. In addition, The PBL program had no effect on experimental group's level of critical thinking dispositions skills while there were increased in control group's level of critical thinking dispositions skills. As well, the student's assessment was higher in all items than tutor assessment. **conclusion:** The PBL program had no effect on experimental group's level of critical thinking dispositions skills while there were increased in control group's level of critical thinking dispositions skills **Recommendations:** it is recommended to utilize the problem based learning strategy in all nursing curriculum and Provide extra training to the faculty staffs to be a perfect PBL tutor and provide training to course planners in developing problems and scenarios that improve the critical thinking abilities and self-directed learning skills.

Keywords: problem based learning – self-directed learning skills and readiness – critical thinking disposition skills.

Introduction:

Nursing education is critical in assisting nursing students to integrate the theory and practice of nursing while helping them transform into professional nurses .The linking of theory with practice can be attained through active learning, where students are encouraged to focus on problem solving, critical thinking, and teamwork [1]. PBL is a teaching and learning method that empowers students to work through a process of actively participating in the learning process, working with peers in small groups to identify learning goals, engaging in self-study, discussing and applying new learning, and finally, integrating a variety of knowledge[٢] .

The PBL method in student learning is a 4-step process that occurs in a specified sequence. First,

students establish the actual problematic issue based on the information provided. Second, students analyze the issue and formulate hypotheses regarding the phenomena. Third, students exercise respective judgment to determine solutions to problems by collecting information from multiple sources. Fourth, learners communicate their findings and summarize the learning experiences [3].

PBL offers the opportunity for students to enhance their critical thinking and self-directed learning skills, and engages students in solving problems .As well, PBL is an instructional approach that challenges students to seek solutions to real-world situations/problems in groups. In addition, PBL provides students with opportunities to direct their own learning while developing critical thinking and evaluation skills through analysis of real-life situations/ problems. PBL increases students' motivations to learn. This approach also allows students to activate their dexterities and synthesize information from specific academic disciplines to find solutions to pragmatic societal problems [4].

Self-directed learning means various types of individual and group activity of students that they have undertaken in the classroom and extracurricular activities at home without the direct participation of the teacher [5].

Self-directed learning has two dimensions self-directed learning readiness and self-directed learning skills. Self-learning readiness is defined as possession level of necessitated attitude, talent and personal features for self-learning. Learners who possess high readiness level for self-learning are conscious of their responsibility in learning and they act independently without any help of others. Also they are curious, willing and have self-confidence who organize their times effectively and have the talent to plan in order to finish their tasks and they are successful in solving problems [6] [7].

Self-directed learning skills are defined as the ability to manage learning tasks without having them directed by others, ability to question inquire and problem solving, ability to keep an open mind to other points of view, ability to translate learning needs into learning goals, plans, and activities, ability to observe and model others' performance to improve, and ability to maintain continuous self - motivation [8].

Critical thinking disposition is defined as tendencies toward particular patterns of intellectual behavior. It contains seven dimensions: truth-seeking, inquisitiveness, maturity, analyticity, open-mindedness, systematicity and self-confidence. Truth-seeking: is to be eager for exploring the knowledge even when the knowledge does not support one's self-interests or one's pre-conceived viewpoints. Inquisitiveness: is to be inquisitive to obtain knowledge even when the knowledge is not used immediately. Maturity: is cautious to make, to suspect and to revise decisions. Analyticity: is to apply reasoning into solving problems and tend to expect the results. Open-mindedness: is to be tolerant of diverse views. Systematicity: is to be organized orderly, focused and engaged in handling the problems. Self-confidence: is to believe in one's own inference and tend to use the skills to solve problems [9].

Significance of the study:

Historically, the teaching of students has been teacher-centered and subject-focused. Nurse educators would be expected to introduce their students to particular knowledge, skills, and procedures which formed

the basis of nursing practice. So nursing education should shifted from a student driven approach where in it student-centered learning replaced teacher-centered teaching in an effort to promote nursing student critical thinking ability , autonomy, and professional identity. In addition, understanding of the theoretical constructs of self-directed learning, academic self-regulation, and learning through motivation in order to support nursing student progression toward autonomous learning by application of problem based learning.

In Egypt there are rapid changes in the health care. The diminished life span of useful information and subsequently increasing complexities of professional nursing practice obligate nursing students to be continues and self-learner throughout their professional career. In addition, the ability of the professional nurse to become self-directed learner is one way of ensuring competences in professional nursing practice, critical think and takes ownership of their lifelong learning. So the researcher applies the PBL strategy that enhances student's critical thinking disposition and self-directed learning.

Aim of the study:

The present study was conducted to evaluate the effect of problem based learning on self-directed learning and critical thinking dispositions among nursing students at Faculty of Nursing Zagazig University.

Research Hypothesis:

Applying problem based learning significantly improve student's self-directed learning and critical thinking dispositions among nursing students at faculty of nursing Zagazig University.

Subjects and methods:

Research design:

A True -experimental design was used to conduct the present study.

Study setting:

The current study was conducted at Faculty of Nursing Zagazig University which includes seven scientific departments, which are: nursing administration, psychiatric and mental health nursing, pediatric nursing, community health nursing, maternal and new born health nursing, medical surgical nursing, and geriatric nursing.

Study subjects:

The subject of the study included the fourth year nursing students who enrolled in second semester nursing administration course in the academic year 2014-2015 for experimental and control group. The Total number of students was 392. A presentative sample was taken randomly.The sample size was calculated by scientific formula and the chosen sample was 192 students. The total number divided into 96 for experimental group and 96 for control group. Students were assigned randomly to be in the experimental or in the control group.

Tools of data collection:

Questionnaire sheet was used to collect data for this study and composed of sixth parts:

Part 1: personal characteristics such as gender, age, marital status, previous education, previous work experience of nursing students.

Part 2: Self-directed learning skills sheet was used to measure the skills of self-learning of nursing students which developed by Sukseemuang [(10)]. It consisted of 10 skill areas that involve the ability to manage learning tasks without having them directed by others. Scored by 4 likert type items as follow : DK: do not have or are not able to use the skill listed(1) ; LO have a low ability to use the listed skills(2); MD have a medium ability to use the listed skills(3); and HI developed experiences and activities to the listed skills(4).

Scoring system:

If the score less than 50% indicated poor, between 50-75 indicated

average, and more than 75% indicated good Obied et al [11].

Part 3: Self-directed learning readiness sheet which developed by Guglielmino et al. [12] to determine the extent to which students perceive themselves as skills and attitudes associated with self-directed learning. It composed of 58 items, scored by 5 likert scale (1= almost never true of me; I hardly ever feel this way), (2= not often true of me; I feel this way less than half the time), (3= sometimes true of me; I feel this way about half the time), (4= usually true of me; I feel this way than half the time) to (5= almost always true of me; there are very few times when I don't feel this way). From the 58 items, 41 items about self -directed learning readiness was scaled positive. The 17 items was had a reverse scored negative to show support for self- directed learning readiness.

Scoring system:

Self -directed learning readiness scale for nursing education (SDLR) the overall score of self -directed learning readiness which ranges from:

• Score > 57 indicating a low level of ability to direct one's own learning.

• Between 57-214 indicating an average level of ability to direct one's own learning.

• Between 214-290 scores indicating a high level of ability to direct one's own learning Abdou, [13].

Part 4: Knowledge Test was developed by the researcher based on related literature to assess of knowledge of the nursing students regarding managerial skills before and after implementing the Problem-Based Learning. It consists of 60 multiple choice questions grouped under six skills namely: communication (10 questions, motivation (10 questions), time management (10 questions), leadership (10 questions), and quality (10 questions), and change (10 questions).

Scoring system:

Each question evaluated through giving score of "1"for each correct answer, and zero for each wrong answer. The total score for each student was calculated and converted into percent score by dividing the student's total score by the maximum possible score.

Part 5: Inventory of the California critical thinking disposition sheet which developed by Facione et al. [14]. It was used to assess critical thinking dispositions skills. It consisted of 75 grouped into seven dispositional characteristics: truth seeking (12 items), open-mindedness (12 items), analyticity (11 items), and systematic (11 items), self -confidence (9 items), and inquisitiveness (10 items) and cognitive maturity (10 items). The response was along a continuum of 5-point likert. The students responses ranges from (1) (strongly disagree , disagree scored (2), neither agree nor disagree scored (3), agree scored (4), strongly agree scored (5).

Scoring system:

If the Score <50 % indicating negatively disposed.

Between 50% to 66. 6% indicating ambivalently disposed.

If Score >66.6% indicating positively disposed.

Part 6: Students' evaluation by tutor and self- assessment: It was adopted from Abdou [13] to examine students' evaluation of the use of problem-based learning after program implementation by tutor students themselves. The questionnaire incudes five categories namely, knowledge base application (6 items), clinical reasoning and discussion making skills (7 items), self -directed learning (6 items), collaborative work (6 items), and attitude during discussion and professionalism (7 items). The response was along a continuum of 3-point likert ranging from relevant, somewhat relevant, and very relevant.

Scoring system:

If the score less than 50% consider poor, if score ranged from 50% to 75% consider average, and if more than 75% consider good Obied et al, [11].

Part 7: Cases of Problem Solving (Scenarios):
Scenarios (NO. 6) were developed by the researcher based on related literature and about actual or potential problems related to the managerial skills in the clinical setting. These managerial skills were (communication- motivation- time management-leadership- quality- change).

Content Validity and reliability:

The questionnaire was translated into Arabic, and then content and face validity were established by a jury of "five" experts from faculties of nursing at Ain Shams University and Zagazig University. Content and face validity sheet involved two parts: the first part included the opinions of the experts for each item that were recorded on a two point scale: relevant, and not relevant; and the second part covered general or overall opinion about the form which express their opinions and comments on the tools for clarity, applicability, comprehensiveness, understanding, any suggestions for any additional or omissions of items and ease for implementation. According to their opinions all recommended modifications were performed by the researcher. As well, internal consistency reliability of the questionnaire by using Cronbach's alpha to assess the consistency of results across items within a test. Cronbach's alpha coefficients were 0.92, 0.96, 0.89 and 0.82, 0.86, 0.88 for students' self- directed learning readiness and skills and critical thinking dispositions, self-assessment, tutor assessment, and knowledge test scales, respectively.

Field work:

Preparation phase:

Training of the staff, seven demonstrators from nursing administration department were trained to be PBL tutor. They trained about the managerial skills and the PBL and how to be a facilitator during the sessions. The researchers trained the staff used 4 sessions in 4 hours the first session, revision on the managerial skills (communication, motivation, time management, leadership, quality, and change) and deciding what specific questions which staff to answer. The second session, introduction about PBL process. Third session, the researcher act as a role player who starts to read one scenario and share alternative with the staff. And, the final session the trained staffs start to read the scenario, solve it, provide alternative. The researcher use power point and group discussion under supervision of two lecturers.

Implementation phase:

Field work of this study was executed in 3 months from beginning of February, till beginning of May, 2015. The program designed for this study has been implemented through 14 sessions. These sessions were lasted for 20 hours; 8 hours for theory (one hour for each theoretical session), and 12 hours of practices (two hours for each practical session .(During the sessions, the experimental group 96 was divided into four sub groups each group included 24 students. Each sub group was divided into small group each group included 6 students during the PBL session. Large group PBL can be mentored by one floating facilitator among several small groups and seven assistant tutors among four medium groups. In this model the faculty tutors spends 5-10 min with each small group combined with periodic large group discussions during the PBL process .
The program consists of two main parts; the first theoretical part covers knowledge about managerial skills such as types of communication channels, barriers of effective communication, meaning and principles of motivation, meaning and strategies of time management. The second part is practical in form of giving situations for students about managerial skills such as; applying principles and skills of effective communication, how to use Herzberg

theory to motivate the nurses, and apply time management process and strategies for optimal use of time.

A special class allocated for teaching the program sessions at faculty of nursing Zagazig University. The researcher used various teaching methods to attract student's attention and motivate them to participate. The teaching methods included group discussion, role play, and brain storming. The teaching media included power point, white papers, and hand book.

Evaluation phase:

The evaluation phase was done by post-test. The same tools used as in the pre -program assessment to determine the effect of problem based learning program on students self - directing learning readiness, skills, critical thinking disposition, and knowledge. The post test data collection continue during the second term for the control group after each lecture, while for experimental immediately after the program.

The program evaluation was applied two times for students in both groups (experimental and control), one before the program and second occurred immediately after completion of the program.

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Pilot study:

A pilot study was carried out on 20 of nursing students to test the clarity of the questions, and determine the time needed to fill-in the questions. These students were excluded from the main study sample. The necessary modifications were done according to the answers and comments made by nursing students.

Administrative and ethical considerations:

An official permission was obtained from the Dean of the Faculty of Nursing after explaining the nature of the work. The researcher fully explained the aim and objectives of the research to the nursing students to get better cooperation during the implementation phase of the research; also an individual oral consent was obtained from each participant in the study after explaining the purpose of the study. Confidentiality of any obtained information was being insured.

Statistical analysis:

Data collected were analyzed by computer using the statistical package for social sciences (SPSS) software version 14. Mean and standard deviation, median and percentages were used for data summarization. Student's t test and Chi square test were used for testing significant differences and relations between variables. Pearson's correlation test was used for testing linear relationship between numeric variables. Significant difference was considered if $p \leq 0.05$.

Results:

Table (1): displays personal characteristics of nursing students. The table indicates the highest percentage of students in the experimental group were in age group 22 to less than 23 years while slightly more than half of students in the control group 52.8% were in age group from 21 to less than 22 years. The highest percentage of students in both groups was female, single and had secondary school (67.7, 56.2%, 67.7%, 98.9%, 93.7%, and 100% respectively. According to previous work experience (61.46%-50%) of students in experimental and control groups had no experience respectively.

Table (2): displays mean scores of self -directed learning skills of nursing students in pre and post PBL program. this table indicates that, there are statistically differences between students in experimental and control

groups related to self-directed learning skills pre and post PBL program.

Table (3): illustrates Frequency distribution of nursing students' levels regarding the self-directed learning readiness pre and post PBL program. This table reveals that 93%of students in experimental group had average level of self-directed learning readiness pre PBL program compared to all students in control group. While 50% of students in experimental group had high level of self-directed learning readiness post PBL program compared to all students in control group had average level of self-directed learning readiness.

Table (4): shows distribution of nursing students' critical thinking disposition levels pre and post PBL program. This table shows that most of nursing students in both experimental and control groups had positive critical thinking dispositions (36.5%, and 77.08%) respectively.

Table (5): shows mean scores of nursing student's knowledge about managerial skills pre and post PBL program .The table clarifies that there are statistically significant differences in the total knowledge score of nursing students in both experimental and control groups regarding managerial skills after PBL program (p=0.001). The mean score of knowledge of the students in the experimental group higher than in those in control group after implementation of PBL program.

Table (6): demonstrates mean scores of assessment items of the studied nursing students (self - assessment by students and by tutor) during PBL program. It is obvious from this table that the assessment by students is higher than the tutor assessment and there are statistically differences between student self-assessment and tutor assessment.

Discussion:

Problem-based learning serves a critical role in teaching learners about themselves as this method provides them with a delicate set of conditions to gain personal insight and to learn more about their educational goals. Learning about oneself fosters aspects of career preparation and liberal education. In addition, PBL is a way of learning that focus on self-directed learning for nursing education due to complexity and changes in nursing profession development and promote critical thinking of nursing students Henderson [(15)].Therefore, the aim of this study was to evaluate the effect of problem based learning on self-directed learning and critical thinking disposition skills among nursing students at faculty of nursing Zagazig University.

Regarding to, Personal characteristics of nursing students, the findings of the present study showed that most of the students aged from (22-23) years. As well, more than half of nursing students were females. In addition, the majority of nursing students had secondary school certificate. As regard, more than half of nursing students had no previous work experience in hospitals.

Results of the present study revealed that there was a significant improvement of self-directed learning skills of students in experimental group post PBL on the contrary of in control group. This result might be due to the PBL method would enable students to develop inquiry, reasoning, to manage learning tasks without having them directed by others, keep an open mind to other points of view, translate learning needs into learning goals, improve student ability to observe and model others and promote their life-long learning skills. This result is supported by the findings of many researchers. Papnczak et al. [(16)] conducted a study in University of Queensland, Australia and found that students participating in problem based learning tutorial sessions appear to exhibit self-directed learning skills as problem solving skills, analytical thinking skills, and personal and interpersonal attributes.

Regarding self-directed learning readiness, the result of the present study revealed that the experimental students' self-directed learning readiness improved with PBL on the contrary of in the control group. This could be attributed to the importance of PBL for the students in finding out activities which lead to high readiness for self-directed learning. These activities as discovering the need for information that they don't have, knowing where to go to get it, knowing when they need to learn more about something, increasing curiosity about things, strengthening students ability to think of many different ways to learn about a new topic. In the same line, El-Gilany and Abusaad [17] carried out a study in Al-Jouf University, Saudi Arabia to examine self-directed learning readiness and learning styles among Saudi undergraduate nursing students and added that self-directed learning has become a focus for nursing education due to the complexity and changes in nursing profession development. In the contrary, in another study carried out by Hawkins et al. [18], at Chatham University in USA, to examine the impact of a PBL experience on applicant responses to self- directed learning readiness and concluded that self- directed learning readiness score did not change significantly after exposure to a small group PBL experience.

Regarding, Critical thinking dispositions of nursing students, the findings of the present study concluded that the implementation of PBL intervention had no effect on experimental student's critical thinking dispositions. This result can be justified according to several reasons. In PBL, critical thinking ability is possibly nurtured through several processes such as discussion, brainstorming session, debate session, interaction, reflection, feedback, and teaching each other. In this study, some of these processes might be less effective with respect to the study sample. Facilitator provided a platform (knowledge and foundation skills), but critical thinking development depends on willingness and an awareness of own thinking (self-reflection). Furthermore, the variable such as critical thinking is a subjective and thus difficult to be determined when critical thinking occurs. Another possible reason is that the critical thinking for PBL students did not increase as expected, due to the program duration. In agreement with these findings, several studies also indicated negative findings or no significant differences of the two groups' comparison in investigating the effect of PBL on students' critical thinking ability. This was illustrated in Polanco et al. [19] study where PBL did not change the first- and second-year undergraduate students' critical thinking ability in Mexican universities. Similarly, Choi [25] studied the effect of PBL on a Nursing Process Course in a quasi-experimental study. The result indicated no significant differences between the pretest and posttest data, for students' critical thinking aspect.

As for, students' Knowledge regarding managerial skills. The findings of the present study mentioned that there was highly statistically significant difference between the experimental and control group in knowledge level. The experimental group gained high score than control group in managerial skills (communication, motivation, time management, leadership, quality, and change). This might be due to that the PBL training program was a successful method that enabled nursing students to fulfill the need of their expected role. PBL also enhanced acquisition, retention, and use of knowledge by students as well as increasing interest in the subject matter because the content subsequently appears more relevant. This ultimately leads to increased motivation to learn among nursing students. The previous finding is

congruent with that of Chng et al [21] who conducted a study that aimed to compare the effects of the problem-based learning (PBL) method with the traditional lecture method on learning in Health Nursing course at University of Illinois at Chicago, Chicago, USA, and found that the knowledge scores of students in the PBL group were higher than those in the lecture group. As well, Li et al [22] conducted a study at Central South University, China and found that all PBL participants had better results for written examination, clinical examination and overall performance than other methods of learning. The previous finding is in contrast to several studies as that of Miller [23] and Rideout et al. [24] showed that the use of PBL produced no statistically significant difference in knowledge acquisition from the traditional lecture method in a nursing course for undergraduate nursing students.

Concerning the mean scores of nursing students' assessment by themselves and by tutor, the findings of the present study indicated that the students' assessment mean scores were high in all items than tutor assessment mean scores. This could be due to the students in a problem based learning were better able to accurately judge their self-performance in compared to tutor judge. The students' self –assessment is an important element of PBL which helps students identify gaps in their knowledge base in order for more meaningful learning to result and allows students to think more carefully about what they know, what they do not know, and what they need to know to accomplish certain tasks .This finding is matching with Chng et al. [21] and Harvey et al. [25] found that the student assessment score was higher than tutor assessment. In the contrary, Dobbs [26] at Walden university and Martinez [27] at California University; mentioned that tutor assessment is more accurate than student self - assessment during problem based learning session because the tutor had the ability to communicate informally with students, consequently create a less threatening learning environment that promotes a free flow exchange of ideas and had a greater impact on learning at each of the PBL phases, which increased the ability of tutor to effective evaluation of their nursing student and increased their ability to explain concepts in a way that is easily understood by students.

Conclusion:

In the light of the main study findings, it can be concluded that, there were statistical significant improvements in the self-directed learning skills, self- directed learning readiness, and knowledge scores among students in the experimental group after PBL program than students in control group. In addition, the PBL program had no effect on students' level of critical thinking dispositions. As well, the self-assessment by students was higher in all items than tutor assessment.

Recommendations:

Based on the results of the main study findings the following recommendations are suggested:

- Utilizing the problem based learning strategy in all nursing curriculum to develop self- directed learning skills, self-directed learning readiness, and critical thinking dispositions that are necessary for lifelong learning and improve professional performance.
- Course planners should receive training in developing problems and scenarios that improve the critical thinking abilities of nursing students.
- Provide extra training to the faculty staff to be a perfect PBL tutor for the success of a problem based learning approach to nursing education
- Applying PBL to large groups in the lecture theatre environment to maintain high level of student and

facilitator satisfaction when there are no sufficient tutors.

- Provide students with needed facilities which improve the self-directed learning as computers and internet, flip chart, library.

Table (1): Distribution of nursing students regarding personal characteristics (n = 192).

personal characteristics		Experimental No=96		Control No=96	
		No	%	No	%
Age in years	21	32	33.33	50	52.08
	22-	58	60.42	35	36.46
	23-24	6	6.25	11	11.46
	Mean ±SD	21.7±0.57		21.6±0.69	
Gender	Male	31	32.29	42	43.75
	Female	65	67.71	54	56.25
Marital	Single	65	67.71	95	98.96
	Married	31	32.29	1	1.04
Education	Secondary school	90	93.75	96	100.00
	Technical institute of nursing	6	6.25	0	0.00
Previous work experience	No experience	59	61.46	48	50.00
	One year	9	9.38	1	1.04
	Two years	10	10.42	23	23.96
	Three years	18	18.75	24	25.00
	Mean ±SD	0.86±1.21		1.23±1.31	

Table (2): Mean scores of self -directed learning skills of nursing students pre and post PBL program (n = 192)

Self-directed learning skills	Pre			Post			Difference		Paired T-test	
	Mean	±	SD	Mean	±	SD	Mean	SD	T	P-value
Experimental group (no=96)	27.48	±	4.94	34.44	±	3.34	6.96	6.00	11.36	0.001*
Control group (no=96)	30.23	±	3.39	28.96	±	4.27	1.27	3.79	3.29	0.001*
T-test T	4.50			9.90						
T-test P-value	0.001*			0.001*						

***Statistically significant at P<.05**

Table (3): Frequency distribution of nursing students self-directed learning readiness levels pre and post PBL program (n = 192)

GROUPS		Self-directed learning readiness scale						Chi-square	
		Pre		Post		Total			
		No	%	No	%	No	%	X^2	P-value
Experimental group (no=96)	Average	89	92.71	48	50.00	137	71.35	42.834	0.000*
	High	7	7.29	48	50.00	55	28.65		
	Total	96	100.00	96	100.00	192	100.00		
Control group (no=96)	Average	96	100.00	96	100.00	192	100.00	-	-
	Total	96	100.00	96	100.00	192	100.00		

*** Statistically significant at P < .05**

Table (4): Frequency distribution of nursing students levels regarding the critical thinking dispositions pre and post PBL program for experimental and control group (n = 192)

Critical thinking disposition skills		Experimental				Controls			
		Pre		Post		Pre		Post	
		No	%	No	%	No	%	No	%
Truth seeking	Ambivalently disposed	49	51.04	69	71.88	36	37.50	22	22.92
	Positively disposed	47	48.96	27	28.13	60	62.50	74	77.08
Open mindness	Negatively disposed	0	0.00	1	1.04	0	0.00	0	0.00
	Ambivalently disposed	24	25.00	20	20.83	39	40.63	22	22.92
	Positively disposed	72	75.00	75	78.13	57	59.38	74	77.08
Analyticity	Ambivalently disposed	21	21.88	27	28.13	34	35.42	22	22.92
	Positively disposed	75	78.13	69	71.88	62	64.58	74	77.08
Systematicity	Ambivalently disposed	29	30.21	48	50.00	25	26.04	36	37.50
	Positively disposed	67	69.79	48	50.00	71	73.96	60	62.50
Self-confidence	Negatively disposed	0	0.00	0	0.00	0	0.00	10	10.42
	Ambivalently disposed	9	9.38	1	1.04	48	50.00	13	13.54
	Positively disposed	87	90.63	95	98.96	48	50.00	73	76.04
inquisitiveness	Ambivalently disposed	44	45.83	27	28.13	50	52.08	60	62.50
	Positively disposed	52	54.17	69	71.88	46	47.92	36	37.50
Maturity	Negatively disposed	0	0.00	0	0.00	10	10.42	0	0.00
	Ambivalently disposed	95	98.96	80	83.33	53	55.21	47	48.96
	Positively disposed	1	1.04	16	16.67	33	34.38	49	51.04
Total	Ambivalently disposed	34	35.42	35	36.46	35	36.46	22	22.92
	Positively disposed	62	64.58	61	63.54	61	63.54	74	77.08

Table (5): Mean scores of the studied nursing student's knowledge regarding managerial skills pre and post PBL program (n = 192)

Domains of knowledge	Groups		Pre			Post			difference		Paired T-test	
			Mean	±	SD	Mean	±	SD	Mean	SD	T	P-value
Communication	Experimental		8.34	±	1.46	9.71	±	0.71	1.36	1.35	9.87	0.001*
	Control		3.61	±	3.16	3.68	±	2.89	0.06	2.79	0.22	0.83
	T-test	T	13.33			19.84						
		P-value	0.001*			0.001*						
Motivation	Experimental		4.65	±	0.95	9.31	±	1.06	4.67	1.22	37.49	0.001*
	Control		1.88	±	1.17	2.83	±	1.70	.96	1.81	5.18	0.001*
	T-test	T	17.99			31.74						
		P-value	0.001*			0.001*						
Time management	Experimental		3.42	±	2.03	9.39	±	0.62	5.97	2.42	24.15	0.001*
	Control		2.03	±	1.49	2.29	±	1.66	0.26	2.18	1.17	0.25
	T-test	T	5.39			39.21						
		P-value	0.001*			0.001*						
Leadership	Experimental		4.63	±	1.27	9.32	±	0.72	4.70	1.45	31.71	0.001*
	Control		2.08	±	1.73	3.20	±	1.80	1.11	1.70	6.41	0.001*
	T-test	T	11.63			30.90						
		P-value	0.001*			0.001*						
Quality	Experimental		3.60	±	1.13	9.80	±	0.40	6.20	1.10	55.14	0.001*
	Control		1.83	±	1.19	3.56	±	1.72	1.73	1.24	13.72	0.001*
	T-test	T	10.56			34.70						
		P-value	0.001*			0.001*						
Change	Experimental		3.82	±	2.37	9.25	±	0.77	5.43	2.93	18.15	0.001*
	Control		1.74	±	1.11	2.50	±	1.69	0.76	1.70	4.38	0.001*
	T-test	T	7.80			35.59						
		P-value	0.001*			0.001*						
Total Knowledge	Experimental		28.46	±	5.41	56.78	±	3.73	28.32	7.01	39.58	0.001*
	Control		13.18	±	5.83	18.06	±	9.21	4.89	6.52	7.34	0.001*
	T-test	T	18.83			38.19						
		P-value	0.001*			0.001*						

*** Statistically significant at P < .05**

Table (6): Mean scores of assessment items of nursing students by themselves and tutor during PBL program

Assessment main items	self -assessment of the experimental group (n=96)			Tutor assessment of the experimental group (n=96)			Difference		Paired T-test	
	Mean	±	SD	Mean	±	SD	Mean	SD	T	P-value
Knowledge base application	11.23	±	1.08	10.75	±	1.70	0.48	1.22	3.84	0.001*
Clinical reasoning and decision making skills	14.85	±	2.80	13.97	±	2.62	0.89	1.27	6.82	0.001*
Self- directed learning	13.82	±	3.78	14.39	±	3.86	-0.56	1.63	-3.37	0.001*
Collaborative work	15.51	±	3.05	14.38	±	3.39	1.14	2.36	4.72	0.001*
Attitude during discussion and professionalism	15.40	±	3.16	13.99	±	2.31	1.41	2.02	6.83	0.001*
Total assessment score	70.81	±	11.81	67.47	±	11.38	3.34	5.16	6.35	0.001*

*** Statistically significant at P < .05**

References:

1. Jerlock, M., Falk, K. and Severinsson, E. Academic nursing education guidelines: tool for bridging the gap between theory, research and practice. Nursing and Health Science. 2015; 5: 219-228.
2. Cook, M. and Moyle, K.: Students' evaluation of problem based learning. Nurse Education Today. 2013; 22: 330–339.
3. Williams, A. F. An Antipodean evaluation of problem-based learning by clinical educators. Nurse Education Today.2015; 19: 659-667.
4. Woody, M., Albrecht, S., and Hines, T. Directed case studies in baccalaureate nursing anatomy and physiology. Journal of Nursing Education, ٢٠١٤; 38(8), 383-386.
5. Kovalenko, N. and Smirnova, A. Self-directed learning through creative activity of students. Procedia - Social and Behavioral Sciences. 2015; 393 – 398. Retrived in 12-12-215. Available online at www.sciencedirect.com
6. Abd-El-Fattah, S.M. Garrison's model of self-directed learning: preliminary validation and relationship to academic achievement. The Spanish Journal of Psychology, 2010; 13 (2), 586–596.
7. Chou, f. and Chen, C. Eperience of Problem Based Learning in Nursing Education at Kaohsiung Medical University. Kaohsiung Med Sci.2009: 25:258-63.
8. Weimer, M. Developing Student's Self-Directed Learning Skills. Faculty Focus Articles, 2010: 96-100.retrived at 12-10-2015.
9. Florena, N. and Hurji, E. Critical thinking in elementary school children. The 6th International Conference Edu World "Education Facing Contemporary World Issues", 7th - 9th November 2014. Procedia - Social and Behavioral Sciences 180 (2015) 565 – 572. Available at www.sciencedirect.com.
10. Sukseemuang, P.Self directness and academic success of students enrolling in hybrid and traditional courses. A dissertation of education, UMI Number: 3372197, 2009. pp: 155-159.
11. Obied, H., Shabaan, F., Shalaby, H. and Gadiry, S. Application of Designed Orientation Program for Nurse Interns Based on Learning Needs

Assessment. Journal of American Science. 2013; 9 (3).

12. Guglielmino, M., Long, H.B, &Hiemstra,R.Self-direction in learning in the united states. International Journal of Self-directed. 2008. 38(8), 383-386.

13. Abdou, E.H. Effect of problem based learning on self directed learning readiness among students in nursing administration. 2013. Unpublished Doctorate Thesis, Faculty of Nursing, El Mansoura University. Egypt.

14. Facione, P.A., Facione N. C., and Giancarlo, C. The Disposition Toward Critical Thinking: Its Character, Measurement, and Relationship to Critical Thinking Skills, Journal of Informal Logic, 1994; Vol. 20 No. 1, 61-84.

15. Henderson, G.: The Relationship between Problem- Based Learning and The development of Critical Thinking Skills in Higher Education. Journal of American Science, 2014; 8(12). http://www.jofamericanscience.org

16. Papinczak, T., Young, L., Groves, M. and Haynes, M. An analysis of peer, self, and tutor assessment in problem-based learning tutorials. Journal of Med Teach; 2007. 29(5):122-32. traceypapinczak@optusnet.com.au.

17. El-Gilany, A. and Abusaad, F. Self-directed learning readiness and learning styles among Saudi undergraduate nursing students. Nurse Educ Today.2012; 8 (12). http://www.jofamericanscience.org

18. Hawkins, S., Hertweck, M., Laird, J. and Goreczy, A. Problem Based Learning Readiness: Evaluation of Physician Assistant Applicant Readiness for Group Learning. International Journal of Medicine and Pharmacy, 2013. Vol.1 No. 1. 29(5):122-32.

19. Polanco, R., Calderon, P. and Delgado, F. Effect of problem based learning program on engineering student's academic achievements, skills development and attitudes in a Mexican University, Innovations in Education and Teaching International, 2012; vol. 41, no. 2, Pp. 145–155.

20. Choi, H. The effects of PBL (Problem-Based Learning) on the metacognition, critical thinking, and problem solving process of nursing students, Taehan Kanho Hakhoe Chi, 2012; vol. 34, no. 5, Pp. 712–721.

21. Chng, E., Yew, E.H. and Schmidt, H.G. Effects of Tutors-related Behaviours on The Process of Problem Based Learning. Journal of Advanced Health Science Education Theory Practice. Oct; 2011;16(14)491-503 esther_chng@rp.sg retrived at 12-2-2016.

22. Li, J., Li, L., Chen, L., Xie, F., Li, P. and Chen, X. Comparison of three problem –based learning conditions (real patients, digital and paper) with lecture-based learning in a dermatology course: A prospective randomized study from china. Journal of Med Teach. 2013; 35(2): 963-70.

23. Miller, R. futures literacy: A hybrid strategic scenario method. Journal of Learning the Future Faster; 2007; 39, 341-362.

24. Rideout, E., England, V., Brown, B., Fothergill, F., Ingram, C., Benson, G., Ross, M., and Coates, A. A comparison of problem-based and conventional curricula in nursing education. Advanced Health Science Education ; 2008; 7, 3–17.

25. Harvey, R., Higenbottam, V., Owen, A., Hulme, J. and Bion, F. Peer-led Training and Assessment in Basic Life Support for Healthcare Students: Synthesis of Literature review and fifteen years practical experience. Journal of Resuscitation; 2012; 83(7): 894-9.

26. Dobbs,VComparing student achievement in the Problem –Based Learning Classroom and Traditional Teaching Methods Classroom.A Disstertation, Walden University (ProQuest Digital Dissertations database) UMI Number . 2008; 3297457,Pp :95-100.

27. Martinez, B. The relationship between student computer self efficacy, self

regulation, and engagement in distance learning .2009; A Disstertation, California University, (ProQuest Digital dissertations database) UMI Number; 3503184.Pp:55, 60, and 95.