

Effect of Problem-Based Learning on Decision-Making Skills among the Undergraduate Nursing Students

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Abstract

Background: Making a decision is a behavior that occurs when a person chooses and implements a course of action from a set of options to address a specific situation or problem. As a result, educators should employ new teaching methods such as problem-based learning (PBL) to help students improve their problem-solving and decision-making skills. **Aim:** To evaluate the effect of problem-based learning on decision-making skills among undergraduate nursing students. **Subjects and method: Design:** To achieve the study's aim, a quasi-experimental research design was used. **Setting:** the study was conducted in the Faculty of Nursing, Beni-Suef University. **Subjects:** based on a convenient sampling of all 356 available undergraduate nursing students in the fourth academic year were selected from previous setting that were divided into two groups "study contained 178 and control contained 178 students" in 2020/2021 academic year. **Three tools were used:** (I) Problem-based Skills Evaluation Sheet, (II) Nursing Students' Decision Making Skills Scale, Tool (III): Student's Feedback Questionnaire. **Results:** The study's findings revealed that there were no statistically significant differences between the study and control groups before intervention. It was observed that 63% of the studied undergraduate nursing students were searched for alternative options compared to 43% in the control group, 66% were canvassing of objectives and values compared to 46% in the control group, 59% were evaluated and re-evaluated of consequences compared to 43% in the control group, and 67% were search for information and unbiased assimilation of new information compared to 41% in the control group. The mean scores of decision-making skills in the study group students increased after applying PBL than before application with a statistically significant difference ($p < .001$). **Conclusion:** The findings of the study concluded that problem-based learning has a positive role in improving undergraduate nursing students' decision-making skills. **Recommendations:** Encourage application of problem-based learning in education among undergraduate nursing students that help improve their decision-making skills.

Keywords: Decision-making skills, Problem-based learning, Undergraduate nursing students

Introduction:

Problem-based learning is guided by a constructivist framework that emphasizes problem-solving should occur in the same environment as the problem, the presence of the problem is what starts and guides the learning process and determines how the problem is solved, and knowledge is expanded through group discussion and collaboration. The PBL method of instruction focuses on several of the expected outcomes of undergraduate education particularly the skills to critically think (Temel, 2018).

Many of the current graduates still lack many skills like communication skills, creativity, analytical and critical thinking skills, problem-solving skills, and decision-making skills. Therefore, there is a sturdy requirement for higher education institutions to focus on training future graduates to be more adaptable to the community needs, as well as to match between graduates' skills and the prerequisite skills for their future careers. In traditional education, teaching is only oriented toward clarification, explanation, demonstration, and evaluation; this was not an effective manner to develop and improve the cognitive skills and

abilities of students (**Hsiao H, & Chang, 2019**).

In contrast, many challenges around the world need students who will be future citizens who will not only build their knowledge capacity but also will develop higher thinking skills such as critical thinking, problem-solving, and decision making. Sequentially, a decisive component of the healthcare workforce fosters the nursing profession and deals efficiently and effectively with changes in the healthcare environment (**Swanson et al., 2019**).

Thus, to keep pace with the rapid healthcare environment changes, nurse educators ought to continuously appreciate, review and update the educational curricula, strategies, and programs utilized to educate the new generation of nursing students. In addition, using innovative teaching strategies can improve the development of the higher level of nursing students' cognitive skills such as critical thinking, communication skills, clinical reasoning skills, problem-solving skills, and decision-making skills (**Bradshaw & Lowenstein, 2018**).

One of the most common innovative teaching strategies which are associated with the large body of literature that comes out of medical education is PBL (problem-based learning). PBL is an inquiry-based method like the student-centered approach that guides students to find the best solutions to real-world problems through cooperative group work (**Opton et al., 2020**).

Problem-based learning is a small group teaching method that was developed to help learners acquire the knowledge, skills, and attitudes of a significant proportion of a course or curriculum. The first definition of PBL is "the learning that results from the process of working toward the understanding or solving a problem" (**Barrows and Tamblyn, 1980**).

Problem-based learning is a student (learner)-centered approach that fosters learners to search and combine theory and practice by utilizing knowledge and skills to evolve a viable solution to the problem. PBL helps students define their needs to learn, develop a list of main points about the problem,

determine what they already understand, what they need to investigate, and then acquire and apply the missing knowledge (**Leary et al., 2016**).

Making a decision is a behavior that occurs when a person chooses and implements a course of action from a set of options to address a specific situation or problem. As a result, educators should employ new teaching methods such as problem-based learning to help students improve their problem-solving and decision-making skills. In addition to the fact that PBL is collaborative, communicative, and cooperative, it also allows students to work in small groups (6 to 8 or 5 to 7 students) with a high level of interaction, peer teaching, and group presentations depending on themselves (**Tan, 2017**).

The environment in PBL develops self-control in students and enables them to see multidimensional events with a deeper perspective. In PBL, there is a clinical reasoning process that develops problem-solving skills including hypothesis generation, questioning, analysis, problem synthesis, and decision-making. It encourages students to learn new materials and concepts when solving problems. It unites theory with practice, as it allows students both to merge their old knowledge with new knowledge and to develop their judging skills in a specific discipline environment. Furthermore, students can acquire the skills of time management, data collection, report preparation, and evaluation (**Akinoglu & Tandogan, 2017**).

Moreover, learning in PBL helps students share their ideas which improve thinking and deepens understanding. PBL creates opportunities for students to interact with the teacher and their peers, which further promotes their conflict resolution skills as well as facilitates a greater student motivation, broadens the use of a variety of learning resources, and encourages team building and group working, self-directed work and communication skills (**Lesperance, 2018**).

Furthermore, PBL gives room for students to search for knowledge and information to solve problems, thus allowing them to learn and acquire problem-solving skills. In addition, when students solve such problems, they

generate hypotheses and face multiple alternatives or solutions to the problem in which they should choose the best one from these alternatives or solutions; thus, such students can acquire decision-making skills (Cassarino, 2016).

Decision-making is a behavior displayed when selecting and implementing a course of action from among alternatives to deal with a particular situation or problem. Furthermore, decision-making is a process that chooses a preferable option or a course of action from a set of alternatives based on given criteria or strategies. It is the process of examining possible options, comparing them, and choosing a course of action (Marquis & Huston, 2016).

Decision-making skills are enhanced and developed through a process of decision-making. Firstly, one should identify the problem or the opportunity. Then, he/she should think up alternative solutions. After that, he/she should evaluate the alternatives and select a solution. Alternatives should be evaluated not only according to cost and quality but also according to ethics, feasibility, and effectiveness. Finally, should implement and evaluate the chosen solution. To ensure the success of implementation, there is a need to do two things: plan carefully and be sensitive to those affected. While evaluating the decision made, if the action does not work, one can give it more time, change it slightly, try another alternative, or start over again (Kinicki & Williams, 2019).

Significance of the study:

Problem-based learning (PBL) is an educational design that emphasizes critical thinking skills, problem-solving, and active participation. It encourages learners to identify their knowledge and skills and apply them to novel situations or to use them, by combining previous knowledge or principles, to achieve specific goals. In other words, PBL results from the process of working towards the understanding of a problem in a powerful classroom process, where students study more for meaning and less for reproduction (Oja, 2015).

Problem-based learning is argued as a learning method that can promote the development of critical thinking skills. In PBL learning, students learn how to analyze a problem, identify relevant facts and generate hypotheses; identify necessary information/knowledge for solving the problem and make reasonable judgments about solving the problem. Implementing PBL in schools and Universities is a demanding process that requires resources, a lot of planning, and organization (Azer & Samy, 2017).

Decision-making is an essential aspect of management and a vital ability for the practice of nursing that enables nurses to perform their complex responsibilities. Nursing students enjoy the problem-based learning format and report that, it leads to improvements in a variety of outcomes, including critical thinking, application of knowledge, active participation in learning, group cooperation, and self-direction and it enhanced their knowledge, understanding, and retention of the subject course (Pourshanzari et al., 2018).

The Aim of the study:

To evaluate the effect of problem-based learning on decision-making skills among the undergraduate nursing students

Hypothesis

Undergraduate nursing students included in problem-based learning strategy will exhibit higher decision-making skills than those not

Subjects and Methods

Research Design:

To achieve the study's aim, a quasi-experimental research design was used.

Setting:

The study was conducted at the Faculty of Nursing, Beni-Suef University, Egypt.

Sample:

Based on a convenient sampling of all 356 available undergraduate nursing students in the fourth academic year in the Nursing Administration Department, Faculty of Nursing, Beni-Suef University during the first semester of the academic year (2020/2021) that

divided randomly into two groups “study and control”, (control group contained 178 students and study group contained 178 students).

Tools for Data Collection:

Three tools were used for data collection:

Tool (I): Problem-based Skills Evaluation Sheet:

This tool was developed by the researchers based on (Osman, 2010 and Mohamed, 1997) and current related literature (Timby & Smith, 2013; Moyet, 2014, Smeltzer et al., 2018). It consisted of two parts:

Part 1: It included items to assess personal data; it included items related to personal data of the students such as age, gender, and residence place.

Part 2: Problem-based Skills Evaluation Sheet:

Included topics were used for pre and post-test to assess nursing students' ability to apply problem-based skills in formulating answers following the framework of problem-based learning. It consisted of four Nursing Administration topics used in the study (change, delegation, empowerment, and team building), which are related to nursing Administration curriculum content.

The questions on the sheet included 100 questions of completion, matching, arranging, and multiple choices to assess nursing students' skills in assessment, analysis (identify problems), outcome identification, planning, implementation, and evaluation of patient's problems.

Scoring system:

The scoring system for data collection was calculated by summing up the scores of each skill of assessment, analysis, outcome identification, planning, implementation, and evaluation of patient's problems. A score of (1) was given for each correct answer and a (zero) for an incorrect answer. A high score indicates high skills in problem-solving. Total score was 100 that categorized into poor (0- <59), moderate (60-84), and good (85-100).

Tool (II): Nursing Students' Decision Making Skills Scale.

The first one named Nursing Student's Decision-Making Skills Scale was developed by Griffin and Van Fleet (2012) to measure the nursing students' decision-making skills. It includes 30 items with five points Likert scale ranging from "not true at all (1) to completely true (5)". The scores for an individual item is one to five. There are four subscales: a) search for alternative options, b) canvassing of objectives and values, c) evaluation and re-evaluation of consequences; and d) search for information and unbiased assimilation of new information.

Scoring system:

It includes 30 items with five points Likert scale ranging from "not true at all (1) to completely true (5)". The scoring system ranged from 30 which mean lower score to 150 which indicated higher score, the higher the score, the higher the level of decision-making skills.

Tool (III): Student's Feedback Questionnaire:

This tool was developed by the researchers based on (Osman, 2010; Mace, 2002) and a review of current related literature (Moyet, 2004). This tool consisted of two subscales that reflect the nursing student's perception of the main features of problem-based learning (7) points and their descriptions of problem-based learning as a teaching strategy (4) point.

Scoring system: the questionnaire has five-point (0-4) Likert types: strongly disagree (0), disagree (1), uncertain (2), agree (3), and strongly agree (4). A higher score "44" indicates a high perception of this teaching strategy.

Validity of the tools:

Content validity was assessed by five experts in the nursing education field who revised the tools for clarity, relevance, applicability, and extensiveness.

Reliability of the tools:

The Cronbach's test was performed to determine tool one's reliability Problem-based Skills Evaluation Sheet, which was 0.88, while

tool two's reliability" Nursing Students' Decision Making Skills Scale" was 0.87, and tool three's reliability " Student's Feedback Questionnaire " was 0.90.

Pilot study:

The pilot study was carried out and involved ten percent of the total sample (36 undergraduate nursing students) to test the simplicity, feasibility, clarity, and applicability of the developed tools, and no modifications were done. The pilot study was included in the total sample of the study.

Ethical consideration:

Official approval was done and obtained through an issued letter from the Dean of Faculty of Nursing, Beni-Suef University to conduct this study. Informed consent was obtained from the administrative authorities, as well as undergraduate nursing students after explaining the aim of the study. To secure authorization for data collection, the purpose of the study was stated, as well as the expected outcomes from its implementation. The participation was voluntary, thus allowing such students to refuse to participate in the study. The participants were told that their information would be kept private and only utilized for research.

Field work:

Official permission from the Dean of Faculty of Nursing, and head of the Nursing Administration Department, Beni-Suef University was obtained to allow data collection from undergraduate nursing students. Data were collected throughout the period from March 2021 to April 2021.

Phases of the study: The study was conducted through the following four phases: Assessment, planning, implementation, and evaluation phase.

I-Assessment Phase

- At the beginning of the interview, the researcher greeted each undergraduate nursing student, introduced herself, and explained the aim and nature of the study. Undergraduate nursing students were divided into two equal groups (study and control).

- According to the regulations, students are divided into two groups (A and B).
- Group (A) studies the first semester nursing courses "Nursing Administration and Mental Health Nursing" and the medical courses for the same specialty, and this is the Study group
- While group (B) is studying community health nursing and elderly nursing, and this is the Control group and the exchange took place between them in the second term
- Assessment of demographic characteristics of undergraduate nursing students, for the fourth-year undergraduates nursing students in the 2020/2021 academic year was done (control group) then an assessment of personal data of undergraduate nursing students for the fourth-year students in the 2020/2021 academic year (study group) before implementation.
- The control group was trained by using the traditional lecture and the study group was trained by using PBL.

II- Planning Phase:

The objectives, priorities, and predictable outcomes were articulated depending on the findings of the previous phase, to meet the undergraduate nursing students' needs.

The undergraduate nursing students were randomly assigned into two groups, the first included 178 undergraduates nursing students who received PBL (study group) the second group involved 178 undergraduates nursing students who received the traditional lectures (control group).

This phase included: researcher preparation for the study, PBL scenarios development, learning environment preparation, and students' training preparation.

A. researcher' preparation included developing handouts about the four Nursing Administration topics used in the study (change, delegation, empowerment, and team building), which are related to nursing Administration curriculum content.

B. PBL scenarios development: four PBL scenarios about four topics were developed using the textbooks and electronic resources.

C. learning environments preparation: the learning environment in which the study was conducted, and all needed resources were prepared.

D. training of students' preparation: the undergraduate nursing students in the study group were divided into 7 sub-groups. The undergraduate nursing students were trained in the PBL technique and decision-making process by using one PBL scenario (empowerment problem). It lasted for four sessions: every session lasted for about 2 hours.

III: Implementation phase:

It was conducted by using three PBL scenarios. It took three weeks: one problem per week (change, delegation, and team building respectively). The three scenarios were assigned to each sub-group. Each scenario lasted for four sessions; the session lasted for about 2 hours.

The Participants were invited to answer the questionnaire in the presence of the researcher for each question to assess students' knowledge about PBL

- Data collection was done during the routine work of the faculty. -The participants took about 25-30 minutes to fulfill the questionnaire.
- At the beginning of the study, four sessions (one session/week, each session 3 hours) were conducted for all nursing students to provide knowledge about PBL and decision-making skills and prepare the students for applying them, sessions were divided as follows; **First session** was included an introduction about PBL strategy, benefits, elements, steps of problem-solving and guidelines for effective utilization of it. **Second session** included the definition of the nursing process, its advantages, characteristics, steps, and the relationship between problem-solving skills and problem-based learning (Timby & Smith, 2013; Moyet, 2014, Smeltzer et al., 2018).
- During the **third and last session** of PBL, the intended learning objectives developed by the course instructors were shared among the students to ensure that, the related knowledge of the basic subject has been

learned the students. - All test items were written in multiple-choice questions and list formats.

- These items asked about the contents of the same four topics to the lecture group and PBL group. By the end of the sessions, students were asked to illustrate their decisions about problems, identify problems (analysis), make an assessment, and identify learning goals, planning, and implementation to achieve these objectives and evaluation.

IV: Evaluation phase:

Evaluation was done through evaluation of the effect of problem-based learning on decision-making skills among the undergraduate nursing students using the same pre- tests tools. Evaluation of problem-solving abilities of the developed topics was done by using Problem Solving Skills Evaluation Sheet (tool 1). Evaluation of the nursing students' decision-making skills was done by the Nursing Student's Decision-Making Skills Scale At the end of implementation, students feeling, reflections, and opinions about problem-based learning strategy were assessed by Student's Feedback Questionnaire (tool 3).

Statistical analysis:

All data were collected, coded, tabulated, and subjected to statistical analysis. Statistical analysis is performed by statistical Package SPSS in general (version 16), also Microsoft Office Excel is used for data handling and graphical presentation. Quantitative variables are described by the Mean, Standard Deviation (SD), while qualitative categorical variables are described by proportions and percentages. Descriptive statistics are used to analyze the response to individual items and the respondents' characteristics. Chi-square and P-value tests were used to test correlation. Mc-Nemar test: It is a non-parametric statistical test that is used to compare frequencies of categories for items measured at different study phases (before and after intervention) where the item responses are dichotomous.

Results:

Table (1): shows the distribution of the studied undergraduate nursing students

according to their personal data. As regard gender, it was noticed that 52% of the studied undergraduate nursing students were females in the study group compared to 55% in control group. As regard age, (95%) of the studied undergraduate nursing students were in the age range from 21-≤24 years with the mean age of 21.2 ± 1.3 years in the study group compared to 94% in control group with the mean age of 21.4 ± 1.1 years. Concerning residence, in the study group (67%) of studied undergraduate nursing students are living in urban areas compared to 63% in control group.

Tables (2): Showed that there was a highly significant differences and improvement in all items of knowledge among undergraduate nursing students regarding PBL.

Figure (1): Illustrated the ability of the undergraduate nursing students to identify topics at pre and post implementation of PBL. It was observed that there was no difference between study group and control group in the pre-test, but (87%) of the undergraduate nursing students in the study group have good ability to identify answers of the topics post implementation of problem based learning compared to (30%) of them before implementation of PBL.

Table (3): Revealed the ability of undergraduate nursing student's in both study and control groups of outcome identification pre and post implementation of PBL. It was observed that (85%) of undergraduate nursing students demonstrate good level of outcome identification post implementation of PBL compared to (20%) pre implementation of PBL in the study group with statistical significant improvement at p value = 0.001. also, the same table revealed that no statistical significant improvement in the control group regarding level of outcome identification

Figure (2): Showed the percentage distribution of the studied undergraduate nursing students in the study groups regarding related to decision making skills, It was observed that 63% of the studied undergraduate

nursing students were searched for alternative options compared to 43% in the control group, 66% were canvassing of objectives and values compared to 46% in the control group, 59% were evaluated and re-evaluated of consequences compared to 43% in the control group, and 67% were search for information and unbiased assimilation of new information compared to 41% in the control group.

Table 4 showed that before utilizing PBL, the mean scores of undergraduate nursing students' decision making skills in both the study and control groups were nearly identical (72.0 8.7 and 73.5 6.5, respectively), with no statistically significant differences ($p = 1.000$). Post implementation, the mean scores of undergraduate nursing students' decision-making skills in the study group increased to (115.3 + 12.2), while undergraduate nursing students in the control group increased to (74.5 + 7.3), with statistically significant differences between the study and control groups ($p = .001$).

From Table (5) it was noticed that , as a positive highly significant correlation undergraduate nursing students' decision making skills and problem based learning by ($P=0.005$).

Table (6): Depicted the distribution of undergraduate nursing students based on their feedback after using a problem-based learning technique. All of them reported the best perceptions about features and descriptions of problem-based learning were toward; encourage students to be active, motivate people to do their best, provide supportive environment, provide learning experiences more than other strategies, stimulate the ability to think, encourage students to share ideas and different opinions, different students have different strengths that help in the solution of problems, students are individually accountable or responsible for their work, the timing is enough for each session and the students working together in small group to accomplish a commontask.

Table (1): Distribution of the studied undergraduate nursing students in the study and control groups according to their personal data (n=356)

Personal data	Study group (n=178)		Control group (n=178)	
	NO.	%	No	%
Gender				
Male	84	47.0	80	45.0
Female	94	53.0	98	55.0
Age(years):				
19- <21	9	5.0	11	6.0
21-<24	169	95.0	167	94.0
Mean and SD	21.2±1.3		21.4±1.1	
Residence				
Urban	119	67.00	112	63.00
Rural	59	33.00	66	37.00

Table (2): Distribution of the studied undergraduate nursing students in the study according to their knowledge about problem based learning pre and post implementation (n=181)

Knowledge about problem based learning	Pre-implementation		Post-implementation		P-value
	No.	%	No.	%	
1-problem based learning definition:					
Incorrect	161	89.0	5	3.0	0.000*
Correct	19	11.0	176	97.0	
1-Is Problem-based learning an effective approach?					
Incorrect	59	33.0	0	0.0	0.000*
Correct	119	67.0	178	100.0	
2. In problem-based learning, what function does the teacher play?					
Incorrect	71	40.0	14	8.0	0.000*
Correct	107	60.0	164	92.0	
3. Determine the leaders, recorders, and facilitator's roles.					
Incorrect	121	68.0	21	12.0	0.000*
Correct	57	32.0	157	88.0	
4. There are usually multiple steps in problem-based learning:					
Incorrect	84	47.0	23	13.0	0.000*
Correct	94	53.0	155	87.0	
5. What is the process of problem-based learning?					
Incorrect	53	30.0	12	7.0	0.003*
Correct	125	70.0	166	93.0	
6. What are the processes in applying a model of problem solving technique to teach problem-based learning?					
Incorrect	57	32.0	155	87.0	0.000*
Correct	121	68.0	23	13.0	
7. Using a problem-solving strategy and rearrange the phases of the PBL model.					
Incorrect	142	80.0	18	10.0	0.000*
Correct	36	20.0	160	90.0	
8. Problem-based learning's advantages					
Incorrect	101	57.0	30	17.0	0.000*
Correct	77	43.0	148	83.0	
9. What are the skills that problem-based learning teaches?					
Incorrect	169	95.0	27	15.0	0.000*
Correct	9	5.0	151	85.0	

Chi-square test

*Statistical significant difference (P < 0.05)

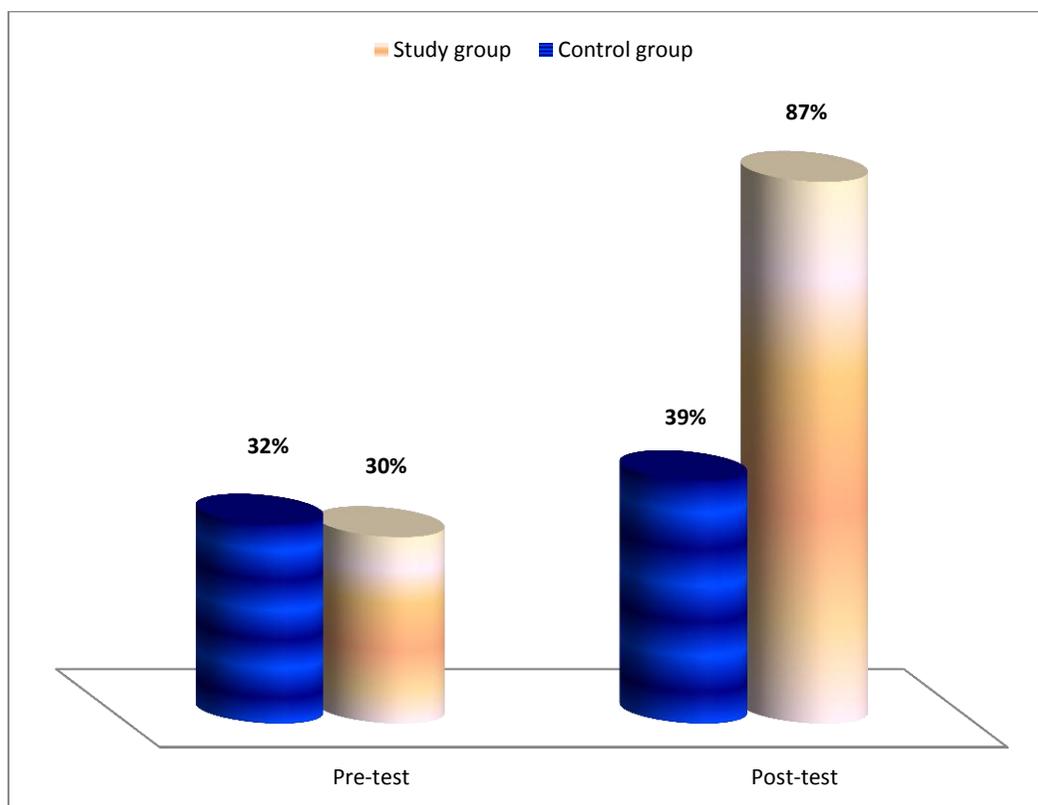


Figure (1): Percentage distribution of the studied undergraduate nursing students in the study and control groups regarding right answers according to their ability to identify topics at pre and post implementation of PBL (n=356).

Table (3): Level of ability of outcome identification among the studied undergraduate nursing students in the study and control groups pre and postimplementation of PBL (n=356)

Outcome identification	Level of ability of outcome identification among Study group (n=178)						Level of ability of outcome identification among Control group (n=178)					
	Poor (0-1)		Moderate(2-3)		Good (4-5)		Poor (0-1)		Moderate (2-3)		Good (4-5)	
	No	%	No	%	No	%	No	%	No	%	No	%
Pre-program	60	34	82	46	36	20	57	32	87	49	34	19
Post-program	0	0.0	27	15	151	85	44	25	98	55	36	20
F	44.29						1.380					
P	0.001*						2.289					

*Significant or $P < 0.05$

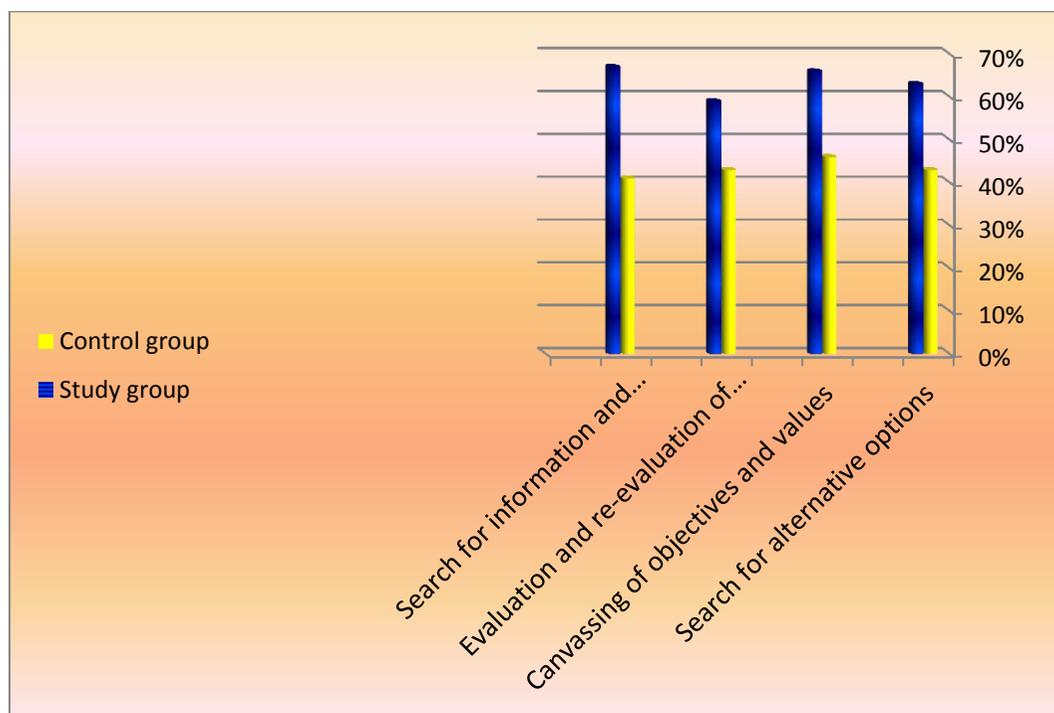


Figure (2): Percentage distribution of the studied undergraduate nursing students in the study and control groups regarding related to decision making skills (n=356).

Table (4): Comparison between undergraduate nursing students’ decision making skills among the study and control groups pre and post implementation (n=356)

Decision making skills	Study group (n= 178)		Control group (n= 178)	
	No.	%	No.	%
Pre- implementation				
• Low	105	59.0	98	55.0
• Moderate	73	41.0	80	45.0
• High	0	0.0	0	0.0
• Mean ± SD	72.0 ± 8.7		73.5± 6.5	
Post- implementation				
• Low	0	0.0	69	39.0
• Moderate	59	33.0	109	61.0
• High	119	67.0	0	0.0
• Mean ± SD	115.3 ± 12.2		74.5 ± 7.3	
<i>MH (p)</i>	6.1 (.001)*		2.6 (.058)	

Table (5): Correlation between undergraduate nursing students’ decision making skills and Problem based learning

Items	Decision making skills	
	R	P
- Problem based learning	0.642	<0.005

Table (6): Distribution of the studied undergraduate nursing students according to their feedback after problem based learning (n=178)

Feedback after problem based learning	No	%
Nursing student's perception about the main features of problem based learning		
Encourage students to be active - Agree	178	100.0
Encourage students to sharing ideas and different opinions - Agree	178	100.0
Provide supportive environment - Agree	178	100.0
Provide learning experiences more than other strategies - Agree	178	100.0
Motivate people to do best - Agree	178	100.0
Stimulate the ability to think - Agree	178	100.0
Interesting experience - Agree	178	100.0
Descriptions about problem based learning as a teaching strategy		
Help in solution of problems - Agree	178	100.0
The students working together in small group to accomplish a common task - Agree	178	100.0
Students are individually accountable or responsible for their work - Agree	178	100.0
The timing is enough for each session - Agree	178	100.0

***Significant or P<0.05** **strongly agree+ agree= agree.**

Discussion:

Problem-based learning is an instructional learner-centered approach that empowers learners to conduct research, integrate theory & practice and apply knowledge and skills to develop a viable solution to a defined problem. It enhances students' learning, critical thinking, and decision-making skills. Nurse educators are challenged to teach nursing students appropriate knowledge and skills for clinical problem-solving. This requires the ability to make an observation, recognize health problems, solve problems in clinical settings, and maintain expertise in a rapidly changing environment (**Gardner, 2014**).

This study aimed to evaluate the effect of problem-based learning on decision-making

skills among undergraduate nursing students. In this respect, **Gunusen et al., (2016)** said that according to their study problem-based learning was a more effective method in the development of problem-based learning skills among students. Also, **Al-Naggar R. and Bobryshev Y. (2017)** reported that the implementation of problem-based learning improved students' problem-solving skills among medical students at the management and Science University in Malaysia.

PBL is an effective teaching /learning strategy that helps to generate and develop critical thinking and 'clinical decision-making' skills which would enable nurses to function effectively in this changing environment (**Simpson and Courtney, 2019**). Presenting clinical problems is the starting point for

learning in PBL. By working through these problems, students think critically about the nature of the problem, generate ideas, and acquire the knowledge and skills required to become a doctor (**Onyon, 2017**).

The current study showed there were highly significant differences and improvements in all items of knowledge among undergraduate nursing students regarding PBL. This finding is supported by the study of **Lim et al., (2018)** who concluded in their study about "The effects of a cognitive-behavioral therapy on career attitude maturity, decision-making style, and self-esteem of nursing students in Korea." and **Tack and Plasschaert, (2019)** who studied " Student evaluation of a problem-oriented module of clinical medicine within a revised dental curriculum " and found that many studies showed that, students got better scores in PBL method

Results of the current study illustrated the ability of the majority of the undergraduate nursing students in the study group has good ability to identify answers to the topics post-implementation of problem-based learning. From the researchers' point of view, it reflected the importance of problem-based learning for nursing students to improve their abilities in the nursing field and guide them to make decisions about problems and health needs. So steps of problem-based learning were examined in the study through the application of problem-based learning strategy and combination with steps of the nursing process.

This study is in the same line as **Terzioglu, (2019)** who studied "The Perceived Problem-Solving Ability of Nurse Managers" and emphasized that the ability to use the problem-based learning is a very important element in professional nursing practice to be able to decrease the cost of the health care and increase the quality of care. Also, **Hsiao & Chang, (2018)** conducted a study about "A Quasi-Experimental Study Researching How A Problem-Solving Teaching Strategy Impacts on Learning Outcomes for Engineering Students" and noted that the development of problem-based learning is the core ability in nursing education.

Results of the current study revealed that the majority of the undergraduate nursing

students demonstrate a good level of outcome identification post-implementation of PBL. This is similar to the result conducted by **Smits et al., (2018)** in a postgraduate medical training program concerning the management of mental health problems for occupational health physicians in the Netherlands which showed that, in PBL, knowledge had increased right after the programs and decreased and concluded that a problem-based program appeared to be more effective in improving performance.

These results might be because, in a well-functioning problem-based learning group, students can share conceptual and procedural knowledge and argument roles. They request clarification, justification, and elaboration from one another. **Swansburg & Swansburg (2017)** supported our study findings and they noted that the process of problem-based learning promotes more complete data collection, creative planning, successful implementation, and better evaluation. Also, **Denning R. & Smith P. (2018)** conducted a study on teaching problem-solving skills; their findings revealed that problem-based learning provides a very powerful tool for teaching problem-solving skills and its steps.

The current study revealed that post-implementation of PBL, the mean scores of undergraduate nursing students' decision-making skills in the study group increased with statistically significant differences between the study and control groups. These findings could be attributed to PBL methods, which encourage students to work in small groups, share their knowledge and ideas, collaborate, brainstorm solutions, and solve issues together. Furthermore, using PBL methods allows students to gain more perspectives from their classmates and work autonomously under the supervision of a researcher who was always available to them.

The findings of the current study highlighted that there was a positive highly significant correlation between undergraduate nursing students' decision-making skills and problem-based learning. From the researchers' point of view, it reflects the positive effects of problem-based learning on improving undergraduate nursing students' decision-

making skills.

These results are in the same line with **Sendag & Odabas, (2019)** who studied "Effects of an online problem based learning course on content knowledge acquisition and critical thinking skills. Computers and Education "and found that Problem-based learning is one of the most important innovative teaching strategies that can foster students' skills like critical thinking, problem-solving and decision-making. Similarly, **Flynn, (2019)**, reported in his study about "fostering critical thinking skills in students with learning disabilities through online problem-based learning. International Conference e-Learning "that the PBL strategy has a positive effect on the nurse students' decision-making skills.

This result was in the line with **Nango and Tanka (2020)** who studied "Problem-based learning in a multidisciplinary group enhances clinical decision making by medical students " and agreed that the clinical decision-making of medical students was affected by the using PBL. The same finding conducted by **Abd El-Hay and Abd-Allah (2015)** who studied "Effect of Problem-Based Learning Strategy on Development of Problem Solving Skills among Undergraduate Nursing Students" and found that there was a significant improvement in nursing students' decision-making skills after applying PBL strategy.

Many studies, including **Harasym et al. (2018)**, concluded that PBL sessions helped students strengthen their decision-making skills. **Sharma (2019)** agreed that PBL was a good way to help nursing students make better clinical decisions. The usage of the PBL technique, according to **Jonassen (2019)**, improves decision-making abilities. Also, **Thabet et al., (2017)** concluded that the PBL strategy is an effective and valuable teaching strategy. It has a curial and an important role in developing and improving nursing students' decision-making skills

In addition, **Linnethe J, (2020)** who studied "supported the study finding and reported that problem-based learning strategy can enhance students' reasoning abilities, critical thinking, and decision-making skills.

The study results revealed that problem-based learning improves the feedback of all undergraduate nursing students. All of them reported the best perceptions about features and descriptions of problem-based learning were toward; encouraging students to be active, motivating people to do their best, providing a supportive environment, providing learning experiences more than other strategies, stimulating the ability to think, encouraging students to share ideas and different opinions, different students have different strengths that help in the solution of problems, students are individually accountable or responsible for their work, the timing is enough for each session and the students working together in a small group to accomplish a common task. These findings could be attributed to encouraging students to share ideas and differing viewpoints, different students possessing diverse strengths that aid in problem-solving, and students working in small groups to complete a common task.

These findings matched those of **Sharan (2020)**, who found that problem-based learning increased mutual liking, acceptance, and support, as well as an increase in a range of thinking processes among group members. **Brady & Tsay (2020)** findings also backed up the idea that problem-based learning is an active pedagogy that promotes superior academic achievement. In addition, **Hagen (2019)** and **Lord (2020)** supported the findings, claiming that problem-based learning improved student performance, motivation, and satisfaction. According to **Savery (2016)**, problem-based learning allows students to undertake research, combine theory and practice, and apply knowledge and skills to create a feasible solution to a problem.

Conclusion:

Depending on the findings and hypotheses of the present study, the study findings concluded that the results support the research hypothesis in implementing problem-based learning has a positive role in improving undergraduate nursing students' decision-making skills.

Recommendation:

Based on the current study results, the following recommendations are proposed:

- Encourage application of problem-based learning in education among undergraduate nursing students that help improve their decision-making skills.
- PBL strategy should be conducted for teaching students in both classroom and clinical settings.
- Replicate the study on a larger sample of teachers in different settings to be generalized.

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