The Egyptian Journal of Hospital Medicine (July 2025) Vol. 100, Page 3774-3782

Problem Solving Ability Training Program and Its Effect on Diploma Nursing Students' Self Esteem and Their Perception toward Clinical Learning Environment

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ABSTRACT

Background: Deficiencies in Problem-solving skills, self-esteem, and a positive perception of the clinical learning environment are common amongst nursing students, underscoring the need for targeted interventions. Nurses with strong Problem-solving abilities are better equipped to analyze patient health issues and formulate effective nursing intervention plans.

Aim of the Study: To evaluate whether a structured Problem-solving training program improves diploma nursing students' Problem-solving knowledge/ability, self-esteem, and perceptions of the clinical learning environment across pre, post, and follow-up assessments.

Subjects and Method: A quasi-experimental study utilizing a pre-post-follow-up design was conducted with 88 second and third-year diploma nursing students. Data were collected via a self-administered questionnaire that included a Problem-solving knowledge questionnaire, a Problem-solving abilities tool, the Rosenberg Self-Esteem Scale, and a tool to assess their perception of the clinical learning environment.

Results: Following the training program, a significant improvement was observed across all parameters. The percentage of students with satisfactory Problem-solving knowledge increased from 10.2% pre-intervention to 100% post-intervention, declining to 70.5% at follow-up. Adequate Problem-solving abilities rose from 60.2% to 97.7% before falling to 72.7%. Student self-esteem and positive perceptions of the clinical learning environment also saw similar increases post-intervention, with a partial decline noted at follow-up.

Conclusion: The training program was associated with substantial immediate improvements in Problem-solving knowledge and ability, self-esteem, and perceptions of the clinical learning environment; partial attenuation was observed at follow-up.

Keywords: Perception toward Clinical Learning Environment**,** Problem Solving Ability**,** Self – Esteem**,** Training Program.

INTRODUCTION

It is critically important for nurses to possess effective coping mechanisms to adeptly manage the pervasive stressors of daily professional life and the complex challenges inherent in the clinical environment. The capacity to manage these demands is directly and inextricably linked to the quality of patient care delivered. The absence of effective coping strategies can lead to professional burnout, compromised clinical decision-making, and a negative impact on patient outcomes [(1)].

A robust **social problem-solving** ability is critically required for nurses to effectively navigate the common challenges of their working environment. This is because the concept encompasses a structured, cognitive-behavioral methodology for resolving problems within the "natural context" or the "real world," which accurately describes the unpredictable nature of clinical practice [(2)].

The professional evolution from a nursing student to a practicing professional is a complex and often challenging period, marked by a substantial struggle to develop and solidify one's professional self-esteem. This critical developmental process is frequently accompanied by feelings of confusion, role ambiguity, and significant stress, all of which can exert a considerable negative influence on the formation of a resilient professional identity and a robust sense of self-worth. Inadequate support during this phase can lead to diminished confidence and increased vulnerability to burnout [(3)].

Self-esteem has been empirically identified as a potent protective factor against psychological distress among nurses, mitigating the risk of burnout, anxiety, and depression. It exhibits a positive correlation with their overall well-being, fostering a sense of personal competence and resilience [(4)].

Furthermore, self-esteem is directly and indirectly linked to job satisfaction. Workers with higher levels of self-esteem have consistently reported significantly greater job satisfaction and have demonstrated elevated motivation, which subsequently contributes to superior job performance. This positive feedback loop enhances both individual well-being and organizational outcomes [(5)].

Clinical learning is an essential pedagogical process that enables nursing students to acquire fundamental psychomotor skills, adapt to the professional milieu, and effectively bridge the well-documented gap between theoretical academic knowledge and practical clinical application. Learning in dynamic clinical environments is a non-negotiable

Received: 21/04/2025
Accepted: 18/06/2025

component of professional nurse training and is fundamental to preparing students for official professional registration in compliance with established competency standards. The nursing education landscape features a multitude of diverse models of clinical education and training, all of which aim to successfully produce nurses who meet the required levels of competency and professional standards [6].

The clinical environment itself can be a highly influential factor in shaping student attitudes and determining their ultimate learning outcomes. As a result, it must be a central focus in all efforts to improve nurse education. Clinical educators and mentors play a vital role by promoting learning through effective role modeling and structured clinical teaching. These relationships are foundational to a student's successful transition into the nursing profession, providing the necessary practical skills and professional identity [7].

Significance of the Study

Nurses routinely encounter a vast array of complex problems and problematic situations directly related to patient management. Their professional responsibilities necessitate the daily provision of care of varying levels of complexity, importance, and urgency. Therefore, the demanding and dynamic nature of today's nursing environment places a premium on a nurse's ability to solve problems effectively and efficiently [8]. The successful application of this ability could contribute positively and effectively to their self-esteem, thereby enhancing their capacity to thrive in a challenging clinical learning environment [9].

Accordingly, the improvement of nursing students' Problem-solving ability through targeted training and educational interventions is deemed a vital and imperative requirement for their professional development

AIM OF THE STUDY

This study aimed to assess the effect of a training program focused on Problem-solving on diploma nursing students. The program's impact was evaluated by measuring changes in the students' Problem-solving abilities, their overall self-esteem, and their perception of the clinical learning environment.

MATERIALS AND METHODS

Research Questions & Hypothesis

The study assessed diploma nursing students' Problem-solving abilities, self-esteem, and perception of the clinical learning environment before and after a Problem-solving training program.

Hypothesis: The program would improve all three outcomes.

Research Design & Setting

A quasi-experimental pre–post–follow-up design was implemented at the Secondary Nursing School in El-Tal El-Kebeer City, Ismailia Governorate, which offers diploma-level nursing education.

Sample & Sampling Technique

The target population included all second- and third-year diploma nursing students (n = 120). Using stratified random sampling, 88 students were selected (44 from each year).

$$n = \frac{N \times p\,(1-p)}{[N - 1 \times (d^2 \div z^2)] + P\,(1-p)}$$

n = Sample size for finite population
N = Total population (120)
p = 0.7
1-p = 0.3
d = 0.05
z = 1.96

$$n = \frac{120 \times 0.7\,(0.3)}{[120 - 1 \times (0.0025 \div 3.84)] + 0.7\,(0.3)}$$

Table 1 presents the sample distribution.

Table 1: Sample size from diploma nursing secondary school in El-Tal El-Kebeer City

Academic year	Total number	Sample taken
Second year	60	44
Third year	60	44
Total	**120**	**88**

Data Collection Tools

Four validated tools were used:

1. **Knowledge Questionnaire on problem-solving abilities** – 25 items (MCQ & True/False) covering definitions, components, types, processes, and strategies of Problem-solving. Scores ≥60% were considered satisfactory [10] (Table 2).
2. **Problem-solving abilities Tool** – 32 items across three domains (confidence, approach–avoidance style, personal control), 6-point Likert scale; ≥60% adequate
(Table 3).
3. **Rosenberg Self-Esteem Scale** – Arabic version, 10 items (5 positive, 5 negative), 4-point Likert scale; ≥25 high self-esteem [11,12] (Table 4).
4. **Perception of Clinical Learning Environment** – Arabic version of **Kuntze et al.'s** tool, 40 items in five domains; higher scores indicate better perception [13] (Table 5).

Table 2: Domains of Students' knowledge regarding Problem-solving abilities.

Domain	No. of items (N= 25)	Example
Definition of problem	2	A problem is a state of dissatisfaction or undesirable results
Components of problem	1	Problem consists of 3 components of the following except
Types of problem	3	Rittman enclosed problems types based on data and goals clarity in
Concept of problem solving	2	Problem solving is one of teaching and daily life styles
Characteristics of problem solving	1	Problem solving characteristics all of the following except
Factors affecting problem solving	2	Problem solving is a mixture between induction and deduction
Thinking styles of problem solving	2	One of the higher thinking styles to solve problems
Steps of problem solving	1	Problem analysis involves eliminating elements that are not included in the problem
Strategies of problem solving	11	Fish bone advantages all of the following except

Table 3: Domains of student's Problem-solving abilities.

Domain	No. of items (N=32)	Example
Problem-solving confidence	11	I trust my ability to solve new and difficult problems
Approach–avoidance style	16	After I have solved a problem, I do not analyze what went right or what
Personal control	5	I make snap judgments and later regret them

Table 4: Domains of student's self-esteem.

Statements	No. of items (N= 10)	Example
Positive	5	I have a positive vision toward myself
Negative	5	I feel that others are better than me

Table 5: Domains of student's perception regarding the clinical learning environment.

Domain	No. of items (N= 40)	Example
Cases	6	I have seen a sufficient number of clinical cases
Authenticity	9	I have the opportunity to apply a patient-centered approach
Supervision	7	My supervisors have good communication skills
Organization of the doctor–patient encounter	11	I was given enough assignments during my clinical rotation
Motivation/learning skills	7	I enjoy learning in clinical sessions

Validity & Reliability

Face and content validity were reviewed by three nursing administration experts. Reliability analysis indicated high internal consistency (Table 6).

Table 6: Reliability coefficients of study tools.

Scales	No. of items	Coefficients
Knowledge	25	Guttman split-half: 0.88
Problem-solving ability	32	Cronbach's Alpha: 0.75
Rosenberg self-esteem	10	Cronbach's Alpha: 0.90
Clinical learning environment	40	Cronbach's Alpha: 0.95

Procedures

Data were collected from **October 2022 to July 2023** (excluding January–February). After permissions, the program was delivered in seven sessions (eight hours theory, two hours practice) over two days/week. Methods included lectures, brainstorming, and group discussion, supported by audiovisual aids. Theoretical content covered problem definitions, components, types, steps, strategies, and their relation to critical thinking; practical sessions involved case-based exercises.

Pilot Study

Conducted on 10 students (10% of sample) to assess clarity, feasibility, and completion time (25–40 minutes). No changes were needed; these participants were excluded from the main study.

Ethical considerations

Participation in the study was entirely voluntary. Explanations of the nature and aim of the study were provided to the nursing students to be included in the study sample after obtaining their informed consent to participate. They were given the choice to refuse participation and they were notified that they could withdraw at any stage of the study. They were also reassured that the information would be utilized confidentially and for research purposes only. The study was approved by the Ethics Board of Suez Canal university.

Statistical analysis

Data management and all statistical analyses were conducted using SPSS statistical software package version 20.0. For descriptive analysis, qualitative variables were summarized using frequencies and percentages. Quantitative data were described using means, standard deviations, and medians. An analysis of variance (ANOVA) was also conducted to evaluate the full regression models.

The level for statistical significance was set at a p-value < 0.05. To assess the inter-relationships between quantitative and ranked variables, a Spearman rank correlation was computed. To pinpoint the independent predictors of students' knowledge, Problem-solving abilities, self-esteem, and perception of the clinical learning environment, a multiple linear regression analysis was employed.

RESULTS

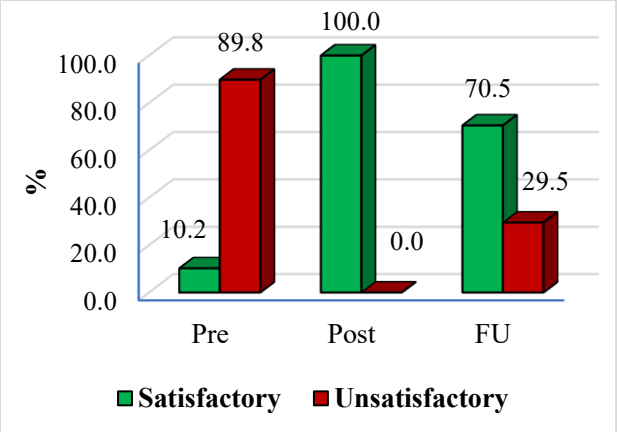
Demographic Characteristics of nursing students

Table (7) shows the study sample consisted of 88 female nursing students whose age ranged between 15 and 18 years, median 17.0 years. Only around one-fourth of them had their fathers and mothers having a university degree, 29.5% and 23.9%, respectively. Most mothers were housewives (73/88, 83.0%), with sufficient income (80.7). More than half resided in rural areas (50/88, 56.8%) with a crowding index <2 persons per room.

Table (7): Demographic characteristics of the study sample (n=88)

	Frequency	Percent
Age:		
15-16	24	27.3%
17-18	64	72.7%
Range	15-18	
Mean± SD	17.0±0.7	
Median	17.0	
Father university education:		
No	62	70.5%
Yes	26	29.5%
Father job:		
Employee	37	42.0%
Manual worker	46	52.3%
Retired	5	5.7%
Mother university education:		
No	67	76.1%
Yes	21	23.9%
Mother job:		
Housewife	73	83.0%
Working	15	17.0%
Family income:		
Insufficient	17	19.3%
Sufficient	71	80.7%
Residence:		
Rural	50	56.8%
Urban	38	43.2%
Crowding index:		
<2	49	55.7%
2+	39	44.3%

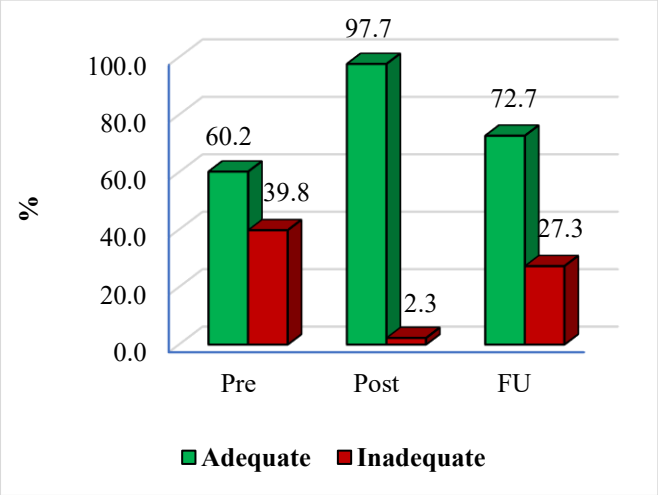
Figure (1) displays only around one-tenth of the nursing students in the study sample (10.2%) had satisfactory total pre-intervention knowledge. This significantly improved reaching 100.0% at the post-intervention phase (p<0.001) and slightly declined to 70.5% at the follow-up phase (p<0.001).



(*) Statistically significant at p<0.05.

Figure (1): Nursing students' level of knowledge of Problem-solving throughout study phases.

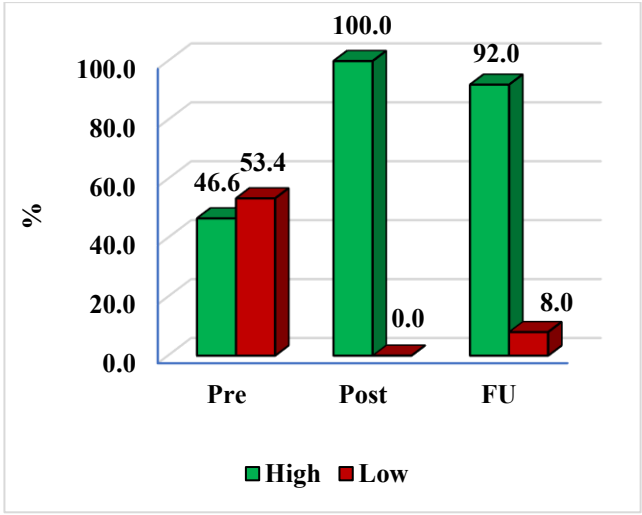
Figure (2) illustrates slightly more than three-fifth (60.2%) of the nursing students in the study sample had adequate Problem-solving abilities at the pre-intervention phase. This significantly improved to 97.7% at the post-intervention phase (p<0.001). It then declined to 72.7% at the follow-up phase.



(*) Statistically significant at p<0.05

Figure (2): Nursing students' level of Problem-solving abilities throughout study phases (n= 88).

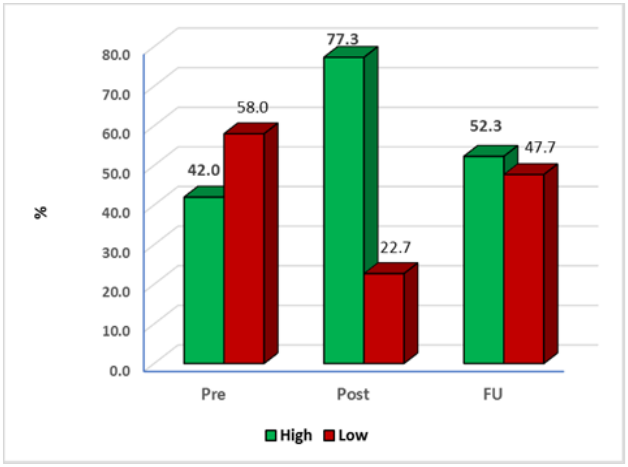
Concerning nursing students' self-esteem, Figure (3) illustrates 46.6% of them had high self-esteem at the pre-intervention phase. This increased to 100% at the post-intervention phase and slightly declined to 92.0% at the follow-up phase. These differences were statistically significant (p<0.001).



(*) Statistically significant at p<0.05.

Figure (3): Nursing students' level of self-esteem throughout study phases (n=88).

Figure (4) displays nursing students' total perception of the learning environment significantly improved from 42.0% at the pre-intervention phase to 77.3% at the post-intervention phase (p<0.001). However, it declined to 52.3% at the follow-up phase.



(*) Statistically significant at p<0.05.

Figure (4): Nursing students' perception of clinical learning environment throughout study phases (n=88).

Overall, Table (8), demonstrate statistically significant moderate positive correlations among nursing students' scores of knowledges, PS abilities, self-esteem, and perception of the clinical learning environment. The strongest correlation was between the scores of perception of clinical learning environment and self-esteem (r=0.552). Conversely, the weakest one was between their knowledge and PS abilities (r=0.367).

Table 8: Correlation matrix of nursing students' overall scores of knowledge, Problem-solving (PS) abilities, self-esteem, and clinical learning environment perception (n=88)

	Spearman's rank correlation coefficient			
	Knowledge	PS Abilities	Self-esteem	Clinical learning Environment Perception
Knowledge	1.00			
PS abilities	0.367**	1.00		
Self-esteem	0.453**	0.431**	1.00	
Clinical learning environment Perception	0.401**	0.536**	0.552**	1.00

(**) Statistically significant at p<0.01.

DISCUSSION

The nursing profession depends on teamwork and collaboration. Hence, nursing education should promote peer learning through social interaction among students, which is a characteristic of the process of Problem-solving [14]. Problem-solving is the ability to solve problems using background knowledge and

previous experience though critical thinking. This requires self-confidence, avoidance approach, and self-control. These have a positive impact on the PS process and its outcome, with the avoidance approach serves to cope with any associated stress [15]. Such stress could arise from untoward clinical learning environment [16].

This study aimed to assess effect of training program regarding Problem-solving on diploma nursing student's Problem-solving abilities, self-esteem, and their perception toward clinical learning environment. It hypothesized that Problem-solving training program will improve the diploma nursing student's Problem-solving abilities, self-esteem and their perception toward the clinical learning environment. The study findings demonstrated significant post-intervention improvements in these students' problem solving (PS) knowledge and abilities as well as in their self-esteem and perception toward the clinical learning environment which lead to acceptance of the set research hypothesis.

According to the present study results, the nursing students in the study settings had variable knowledge of the different areas of problem and (PS) before implementation of the training program. Thus, around two-thirds or more of them had satisfactory knowledge regarding the definitions of the problem and of PS. This could be explained by the fact that their curricula only contained such definitions with no further details. Thus, their knowledge of the types and characteristics of problems, as well as the steps of and methods of PS were clearly deficient.

These current study findings highlight students' need for more in-depth and applied related information and knowledge. In this respect, the importance of conceptual learning has been stressed by ***Fletcher et al***. **[17]**. In such learning, students are encouraged to organize their acquired knowledge, attitudes and skills which learners organize concept-relevant knowledge, skills and attitudes to develop logical cognitive associates. This would lead to better assimilation, retention and retrieval of such information. It also helps in applying the concepts to relevant situations.

The present study was also concerned with nursing students' PS abilities. The pre-intervention results indicated that more than one half of them had adequate abilities related to PS-confidence and approach avoiding style. Conversely, slightly more than one-fourth of them had adequate abilities related to self-control. Yet, self-control is essential for successful application of Problem-solving skills as outlined in a study in Turkey [18].

These foregoing present study findings are undoubtedly attributed to the training program implemented to the nursing students indicating its effectiveness. However, the positive effect of the training program was an indirect one through improving these students' knowledge of PS as shown in the multivariate analysis where the knowledge score was identified as a significant independent positive predictor of the students' PS abilities scores.

In agreement with this present study finding, a study in Iran reported significant improvements in nurses' PS abilities following implementation of the training program [19]. Similarly, a training program administered to nursing students in Hong Kong led to significant improvements in their PS abilities [20]. On the same line, a training program administered to nursing students in the Netherlands was effective in improving their PS skills [21].

The success of the implemented training program could be due to the program's content and process. As regards content, the training program was tailored to the students' identified needs related to PS. As for the process, the training program had a major applied component with role-playing and hands-on training of the students. In congruence with this, a study on nurses in China found that combining role-playing in training led to more successful outcomes [22].

The current study has also investigated nursing students' self-esteem. The results demonstrated that slightly less than one-half of them had high self-esteem before implementation of the training program. This is quite alarming since it reciprocally indicates that more than one-half of these students have low self-esteem. This could be explained by that the technical education is generally viewed at a lower level when compared with general education, which would have a negative impact on these students' self-esteem. In congruence with this, a study in Korea revealed a significant association between nursing students' self-esteem and their look at their future nursing career [23].

Concerning the nursing students' characteristics with significant relations with their self-esteem, the present study results revealed positive associations with their age and school year. The findings are quite plausible as these students' maturity would increase with age and academic progress. However, only the relation with age persisted in the multivariate analysis, which indicates its independent significant relation with self-esteem with no confounding effect. In line with this, ***Choi*** **[24]** in a study in Korea reported a positive association between nursing students' self-esteem, Problem-solving abilities, motivation, and their maturity.

The current study nursing students' self-esteem demonstrated statistically significant improvements with all of them reaching the level of high self-esteem at the post-intervention phase, with a very slight decline at the follow-up phase. This improvement was due to the direct and indirect effects of the training program as revealed in the multivariate analysis. The indirect effect was through improving the students' scores of knowledge and perception of the clinical learning environment.

This foregoing present study finding could be explained by that a more knowledgeable student with clear perception of the clinical learning environment is

more likely to achieve the learning outcomes which would foster his/her self-confidence and self-esteem [25]. In agreement with this, a study in Turkey demonstrated a significant improvement in nursing students' confidence and self-esteem following the implementation of a training program in Problem-solving [26].

The last parameter addressed in the present study was the nursing students' perception of the clinical learning environment. Their perception was variable before the implementation of the study intervention. It was very low in the dimensions of cases, authenticity, and organization of doctor-patient encounter, average for motivation/learning skills, and high for supervision. The low perception reflects the lack of number and variety of cases available for their training, the lack of true opportunities to learn through participation and practical application, and their feelings regarding learning.

A similar pattern in nursing students' perception of the various dimensions of the **clinical learning** environment was reported in a study conducted in Saudi Arabia [27]. Additionally, another study of female undergraduate nursing students in the same country found that students' high stress scores directly reflected their low perception of the clinical learning environment [16]. These findings suggest a consistent challenge in creating supportive clinical settings for nursing students in the region.

A low perception of the **clinical learning environment** among nursing students in this study could significantly hinder their educational experiences, as a positive and comfortable setting is crucial for effective learning outcomes [28]. **Shinners *et al.*** [29] emphasized that the clinical environment should be specifically adapted to enhance key skills like Problem-solving and teamwork, which are fundamental to professional nursing practice.

Nevertheless, the positive effect of the training program on nursing students' perception of the clinical learning environment was demonstrated in the results of the multivariate analysis. This effect of the program was an indirect effect effected through improving students' knowledge and PS abilities as these were identified as significant independent positive predictors of their perception scores. This implies an important role in improving nursing students' PS knowledge and abilities on their perception of their learning environment. In congruence with this, a study in Finland found that the use of the PS educational approach for nursing students helped them to cope with the stressors encountered in their clinical learning environment [30].

Lastly, the present study analyses demonstrated significant moderate positive correlations among nursing students' scores of knowledge, PS abilities, self-esteem, and perception of the clinical learning environment. The findings corroborate the reciprocal positive effects of each of these four parameters on each other. This is due to the fact that PS helps students to find a solution that satisfies everyone involved in the process, which leads to increased confidence and self-esteem.

In line with this, ***Oermann and Shellenbarger*** [31] found that the students who have effective PS abilities also have high self-esteem and more confidence. Conversely, low self-esteem is associated with negative PS abilities [32].

CONCLUSION

The study results lead to the conclusion that the nursing students in the study settings have deficient knowledge about Problem-solving (PS), average PS abilities, self-esteem, and perception of learning environment. The implementation of the training program is effective in improving all these four parameters immediately after its end, with some declines at the follow-up phase, especially regarding their perception of the learning environment. The scores of knowledge, PS abilities, self-esteem, and perception of the clinical learning environment are positively correlated. The training program is a direct predictor of the scores of knowledge and self-esteem, and indirectly on the scores of PS abilities and perception of the clinical learning environment through the knowledge scores.

RECOMMENDATION

Based upon the results of the current study, the following recommendations were suggested:

Recommendations related to nursing administrators:

- Implementing training program on a wider scale in similar settings.
- Including the topic of Problem-solving abilities in more depth and with practical applications in all nursing schools.
- Applying the Problem-solving approach in the various nursing schools and institutes as an innovative learning method.

Recommendations related to nursing educators:

- Designing training program for the nursing educators to increase knowledge and skills of problem solving abilities.
- Training the nursing educators in various nursing schools and institutions in the application of the Problem-solving approach for their students. This could be done through on-the-job and off-the-job training.
- Nursing educators in nursing schools should adopt suitable methods of teaching such as problem-Based Learning (PBL).

Recommendations related to nursing students:

- Monitoring and surveying students' self-esteem and perception of their clinical learning environment periodically for the diagnosis and remedial of any deficiencies.
- Providing nursing students with activities, assignments and problem cases that allow students to increase their problem solving abilities.
- It is not just enough to acquire the knowledge and the skills involved in problem solving abilities, nursing students should encouraged to apply such skills in their daily lives.
- **Further research** is needed to investigate the impact of the use of the Problem-solving approach in education on nursing students' performance after graduation.

- **Funding:** Not provided.

- **Conflicts of interest:** None of the writers of this paper have mentioned any possible conflicts of interest.

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