

# Assessing the Reflection in Learning Ability of Nursing Students: Psychometric Properties of Reflection in Learning Scale

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## Abstract

**Background:** Reflection plays an important role in in-depth learning. Reflective ability must develop among students of medical sciences.

**Objectives:** The aim of this study was the psychometric assessment of the Reflection in Learning Scale and evaluating this ability among nursing students.

**Methods:** This descriptive-analytical cross-sectional study was conducted on nursing students of Shahid Sadeghi University of Medical Sciences (Yazd, Iran) in 2019. The participants selected by census. The research was conducted in two phases. In the first phase, the validity (qualitative and quantitative methods), Confirmatory factor analysis and reliability of Reflection in Learning Scale were evaluated. In the second phase, the reflection in learning was assessed using this tool. Data were analyzed using descriptive and analytical tests by SPSS software.

**Results:** The content and face validity of the scale were confirmed. Internal consistency of the instrument was 0.92 using Cronbach's alpha coefficient and ICC of 0.90 determined. Confirmatory factor analysis revealed acceptable indices: goodness of fit index = 0.89, standardized root mean square residual (SRMR) = 0.06, root mean square error of approximation = 0.18. Learners' reflection ability with a mean score of  $4.37 \pm 1.04$  was at a moderate level.

**Conclusion:** The Persian version of Reflection in Learning Scale is a valid and reliable tool and can be used to assess reflection abilities in learners. Nursing students' reflection ability was at a moderate level. Therefore, planning to assess reflection ability in nursing education by the tool is recommended.

**Keywords:** Reflection Ability, Learning, Validity, Reliability

## Background

One of the concerns of medical education systems is obtaining professional qualifications by learners to act properly in their future career (1). Today, professional competence is defined as a complex and multidimensional construct that includes dimensions beyond technical skills. Regarding obtaining different skills, obtaining technical skills along with non-technical skills, such as lifelong learning, performance-based learning, and adherence to the excellence principles are emphasized (2). Therefore, in addition to gaining clinical competencies, learners are expected to develop their decision-making and lifelong learning skills through using problem-solving, critical thinking, and reflection. These skills help learners to improve their skills in their future careers (3).

Reflection is one of the basic skills in medical students and plays an important role in gaining clinical competencies

(4). Reflection ability was first introduced in 1933 by John Dewey (1). Reflection in learning used by medical fields was used in the late 1990s in the United Kingdom and the United States. Reflection means thinking about an experience purposefully to analyze performance and judge strategies for improving performance, knowledge development, and attitude (5). According to cognitive and humanism theories, reflection in learning is one of the methods for deep learning (6).

The steps of reflection as an educational strategy which combines or links action and thought (7) includes goal setting, structure explanation, learning atmosphere, feedback, and evaluation (7). Reflection is defined as doing something by a person and thinking about this activity. The skill of reflection regarding our actions and critically analyze them to promote professional activity improves clinical competence and self-confidence among students

(9, 8). In addition, the use of reflection increases students' self-awareness and their ability to use thinking and patient care strategies (7). In addition, this skill leads to improved reasoning, problem-solving, critical thinking, and lifelong learning skills that facilitate decision-making in complex and challenging situations (7). The results of Pai research showed that self-reflection during practical training effectively improves the clinical and thinking abilities of nursing students and reduces their work stress (10). Therefore, it is necessary to monitor the students' skill of reflection and plan to improve it.

The Accreditation Council for Graduate Medical Education (ACGME) defines performance-based learning as one of the core competencies, during which the learner should be able to use his experiences to learn and develop individual and professional skills by developing mental skills, such as self-awareness, self-regulation, reflection ability, and critical thinking (2). In medical science systems, where learning takes place mainly in educational and work environments, it is more important to develop reflection ability. The learning cycle for the learner is completed in workplace-based education when the learner is able to complete the stages of the experiential learning cycle with the acquired skills (11). The skill of reflection is helpful in guiding the learner during the process of experiential learning. This is especially important in nursing, which is often based on workplace-based education. Therefore, acquiring high levels of mental skills, such as reflection ability, is essential among nursing students (13, 12).

### Objectives

Although the development of mental skills, such as the reflection ability has received special attention in medical education programs, this requires serious attention in the process of planning and implementing curricula in various fields. The use of valid tools in assessing skills, such as the reflection ability can be used to provide feedback to learners and plan for the development of this skill among learners. A review of conducted relevant studies showed that in Iran, there is no reliable tool to measure the reflection in learning. Therefore, the present study was conducted to evaluate the validity and reliability of the Reflection in Learning Scale and to determine the reliability skill among nursing students of nursing schools affiliated to Shahid Sadoughi University of Medical Sciences.

### Methods

This descriptive-analytical cross-sectional study was conducted in two phases. In the first steps, the psychometric properties of the Reflection in Learning Scale, including its validity and reliability were examined. In the second phase, the reflection ability of nursing students in Shahid Sadoughi University of Medical Sciences was evaluated using the Reflection in Learning Scale.

The study population in the first phase included the experts in medical and nursing education ( $n = 24$ ) and nursing students ( $n = 27$ ) to assess the validity and reliability of the tool. In the second phase, 100 nursing

students who were studying in nursing schools affiliated to Shahid Sadoughi University of Medical Sciences were selected by the census method. The Reflection in Learning Scale consists of 14 items. The instrument was first developed by Sobral and its validity and reliability were confirmed. (Cronbach's alpha = 0.81). The scale is scored on a seven-point Likert scale from never (score 1) to always (score 7). The total score of the scale is calculated from the average score of 14 questions per person. Then, the reflection level is classified into three levels: poor (1 to 2.99), moderate (3 to 4.99), and strong (5 to 7) (14).

#### Step1: Validation and Reliability of the Scale:

The First place, the scale was translated into Persian separately by two experts fluent in English. The text of the two translated versions was compared, and a Persian version of the scale was prepared. In the next step, the back translation was done by a fluent English translator and the Persian translation of the scale was translated to English. In the last step, the Persian version of the tool was finalized by comparing it with the original version of the scale by a person fluent in both English and Persian.

In the next step, the face and content validity of the scale were examined qualitatively and quantitatively. Delphi method was used for qualitative assessment of the content and face validity from the experts' perspective. Accordingly, along with the scale, the consent form and Delphi implementation guide were provided to the experts. They were asked to rate the items of the scale in terms of the level of difficulty (difficulty in understanding phrases and words), degree of appropriateness (appropriateness and the proper relationship of the phrases with the purpose of the scale), and ambiguity (possibility of misinterpretations or inadequacies in word meanings). Two weeks after conducting the first round of Delphi technique, the opinions of experts were noted. The researchers then added all the suggestions to the initial scale in a separate column (confidentiality of the information was regarded), to confirm the contents, the comments were sent back to the experts, and they were asked to provide additional comments on the scale items (second round of Delphi technique).

Two weeks later, comments were recorded, analyzed, and sent for the third round, but no new comment was provided. Then, quantitative content validity indices, including content validity ratio (CVR) and content validity index (CVI) were examined. In order to determine the CVR, the experts were asked to examine each item on a three-point scale (necessary, useful, but not necessary, and not necessary) (15). The minimum CVR value was determined based on the Law she table. CVI is a measure of the relevance of each item in the scale, which was assessed on a four-point Likert scale (very relevant, relevant, somewhat relevant, and irrelevant) (16). The construct validity of the scale was assessed using confirmatory factor analysis (CFA). Internal consistency was assessed using Cronbach's alpha and a reproducibility test was performed using the Intraclass correlation coefficient (ICC). In the test-retest method, each participant completed the scale at an interval of two weeks.

### Step 2: Assessment of the Reflection in Learning

In order to assess the reflection in learning ability, nursing students in the schools affiliated to Shahid Sadoughi University of Medical Sciences were selected by census. In this step, 100 nursing students voluntarily participated and completed the scale.

Descriptive statistics indices (mean and standard deviation) were used to determine the reflection level of learners. Pearson correlation test was used to determine the relationship between reflection scores and demographic variables and field of study. One-way analysis of variance (ANOVA) and Independent t-test were used to examine the differences between groups. Also, the least significant difference (LSD) post-hoc test was used to compare the level of reflection of the groups with each other. The data were analyzed by SPSS software version 19 (version 19, SPSS Inc., Chicago, IL) and AMOS software version 22.

### Results

A total of 24 experts in medical and nursing education participated in assessing the qualitative and quantitative validity of the Reflection in Learning Scale. The demographic information of the participants is presented in Table 1 according to the qualitative and quantitative measurement of the validity and reliability of the scale. All participants confirmed the content and face validity of the scale. The results of CVR showed that all items obtained values higher than 0.49. Regarding CVI, all items obtained values higher than 0.79 and remained on the scale. Finally, the quantitative and qualitative validation

of the scale with 14 items was confirmed. In addition, 27 nursing students participated to assess reliability. The internal consistency of the tool (Cronbach's alpha coefficient = 0.92) and reproducibility (ICC = 0.90) was confirmed. The construct validity of the scale was assessed using the CFA method and approved (moderate) with the following values: goodness of fit index (GFI)=0.89, standardized root mean square residual (SRMR)=0.06, root mean square error of approximation=0.18,  $\chi^2/df=1.78$ .

In the second stage, the participants consisted of 100 nursing students, including 57 women (57%) and 43 men (43%) with a mean age of  $22 \pm 3$  years. According to the academic year, 21 students (21%) were freshmen. Of the rest, 30 students (30%), 26 students (26%) and 23 students (23%) were in their second, third and fourth year. The mean score of the learners' reflection ability ( $4.37 \pm 1.04$ ) was at a moderate level. The mean score of each item is presented in Table 2.

The results of the present study showed that the mean score of reflection ability based on gender was not significantly different ( $P = 0.14$ ); however, it was significantly different in terms of the academic year ( $P = 0.006$ ) (Figure 1). The results of the LSD test showed that the score of first-year nursing students was significantly lower than other scores. ( $P < 0.05$ ). According to the LSD results, the score of reflection in first-year nursing students was significantly lower than the others. The score of first-year students was significantly lower than second-year ( $P = 0.04$ ), third-year ( $P = 0.001$ ) and fourth-year students ( $P = 0.03$ ).

**Table 1.** Demographic characteristics of the participants in the first stage of the study (Assessing the validity and reliability of the Reflection in Learning Scale)

Demographic information		Qualitative validity	Quantitative validity	Reliability
Field of study, No. (%)	Medical education	3 (33.33)	5 (33.33)	-
	Nursing	6 (66.67)	10 (66.67)	27
Age, (year) mean $\pm$ SD		$36 \pm 6$	$34 \pm 6$	$22 \pm 3$
Gender, No. (%)	Male	5 (55.56)	5 (33.33)	13 (48.15)
	Female	4 (44.44)	10 (66.67)	14 (51.85)
Total		9	15	27

**Table 2.** Mean scores of items of Reflection in Learning Scale of nursing students of Shahid Sadoughi University of Medical Sciences

Items	Mean $\pm$ SD
1. Carefully planned my learning tasks in the courses and training activities of the medical program	4.30 $\pm$ 1.58
2. Talked with my colleagues about learning and methods of study	4.40 $\pm$ 1.52
3. Reviewed previously studied subjects during each term	3.44 $\pm$ 1.27
4. Integrated all topics in a course among themselves and with those of other courses and training activities	3.91 $\pm$ 1.38
5. Mentally processed what I already knew and what I needed to know about the topics or procedures	4.28 $\pm$ 1.42
6. Been aware of what I was learning and for what purposes	4.61 $\pm$ 1.33
7. Sought out interrelations between topics in order to construct more comprehensive notions about some theme	4.60 $\pm$ 1.24
8. Pondered over the meaning of the things I was studying and learning in relation to my personal experience	4.92 $\pm$ 1.27
9. Conscientiously sought to adapt myself to the varied demands of the different courses and training activities	4.55 $\pm$ 1.32
10. Systematically reflected about how I was studying and learning in different contexts and circumstances	4.47 $\pm$ 1.21
11. Mindfully summarized what I was learning day in, day out in my studies	4.44 $\pm$ 1.59
12. Exerted my capacity to reflect during a learning experience	4.43 $\pm$ 1.37
13. Diligently removed negative feelings in relation to aims, objects, behaviors, topics or problems pertaining to my studies	4.31 $\pm$ 1.51
14. Constructively self-assessed my work as a learner	4.56 $\pm$ 1.23

The score of reflection ability in second-year students was significantly higher than the scores of the first-year students ( $P = 0.040$ ) and lower than third-year students ( $P = 0.030$ ). There was no significant difference between the scores of second- and fourth-year students ( $P = 0.05$ ). The score of third-year students was significantly higher than the scores of first-year students ( $P = 0.001$ ) and second-year students ( $P = 0.030$ ), but this difference was not observed between the scores of the third- and fourth-year students ( $P = 0.520$ ).

### Discussion

The reflection ability is an essential skill that plays an effective role in the deep learning process and the improvement of learners' professional competencies. The results of the present study showed that the reflection ability of nursing students was at a moderate level. Because in nursing is performance-based learning and the use of mental skills are necessary, the education system should be highly considered for the development of these skills. Based on the obtained results, the Reflection in Learning Scale is a valid tool and can be used to assess the reflection skill.

The learner through therapeutic care can improve his/her professional performance using reflection on experiences and learnings. In other words, reflection increases learners' capacity to critically analyze and review past experiences (17) and effectively improves learners' self-regulation, diagnosis, critical thinking, and performance (19, 18). Clinical experiences, self-reflection, and work stress are recognized as predictors of students' clinical competencies (10). Therefore, the clinical competence of learners can be improved by creating opportunities for learners to gain experience and development of their reflection skills. According to our results, the reflection skill of the students was at a moderate level; thus, planning to improve this ability among learners seems necessary.

Based on our results, reflection in senior students was significantly higher than in first-year students. This can be due to how the person learns based on experience gained through education. The findings of Aukes et al. confirm the upward trend of learners' reflection skills through education; however, the use of an experimental learning approach can increase the improvement of their reflection ability (20), which was consistent with the results of the present study. The findings of Embo et al. showed that there was a significant relationship between reflection ability and performance of nursing learners during the academic years (21). Therefore, in accordance with the expected abilities through education, it is necessary to design and implement an appropriate plan for the development of reflection skills in the education process.

The reflection on an individual's performance during and after activities enables the learner to reflect on their experience and learn from their experiences, which reduces the gap between theory and practice (22).

The results of the present study showed that the learners' scores in "thinking about the meaning of what

they have learned and experienced, making a link between different concepts and understanding the objectives of the subjects" were higher than other items. Learners also rated their performance at the lowest level in applying cognitive learning strategies, such as reviewing previous information and creating meaningful cognitive structures. Cognitive strategies refer to actions, by which the learner prepares new information to link or combine with previously learned information and store it in long-term memory (learning). These strategies are classified into three general categories: "repetition or review, expansion, and organization." One of the important cognitive strategies is the semantic extension, which is defined as adding meaning to new information to relate it to previously learned information. In other words, the learner makes a link between what he already knows and what he intends to learn, which is done by adding more details to the new information, creating examples, and inferring about it (23).

Learners do not seem to be good at cognitive strategies, including reviewing and applying what they have learned. This can be due to individual and systemic reasons. Lack of training on mental skills and cognitive-metacognitive learning strategies and unwillingness to use them can affect the results. In addition, systemic problems, such as overemphasis on technical skills, neglecting non-technical and mental skills in teaching different fields of medical sciences, and no use of active teaching-learning methods can affect the results of self-assessment. A development in nursing education requires a review of the teaching methods of the traditional system of nursing education (7).

Given that it is important to encourage learners to think by practical strategies (7), it seems that planning is necessary to develop the reflection ability of nursing students. Interventional studies are recommended to investigate the effect of using cognitive and metacognitive strategies as well as reflection skills. The present study was a descriptive cross-sectional study. It is suggested that longitudinal research be conducted in the future. In addition, the limited number of students in the present study limited the generalizability of the results.

### Conclusion

In the present study, the reflection ability of nursing students was assessed at a moderate level. In this regard, planning is needed to develop this ability in the studied faculty. The psychometric properties of the Persian version of Reflection in Learning Scale was approved; thus, it can be used to assess learners' reflection skills.

### Supplementary Material

Supplementary material(s) is available here [To read supplementary materials, please refer to the journal website and open [http://sdme.kmu.ac.ir/jufile?ar\\_sfle=804768](http://sdme.kmu.ac.ir/jufile?ar_sfle=804768)].

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