Original Article

Assessment of reflection-based education on reflective thinking skills of dental students: A quasi experimental study

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[DOR: 20.1001.1.29807670.2023.16.49.1.2]
[DOI: 10.52547/edcj.16.49.1]

Article Info

Article history:
Received 18 Dec. 2022
Accepted 13 Feb. 2023
Published 27 Mar. 2023

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How to cite this article:
Kazemipoor M, Keshmiri F. Assessment of reflection-based education on reflective thinking skills of dental students. J Med Edu Dev. 2023; 16(49): 1-6.

Abstract

Background & Objective: Reflection plays an important role in the students' learning. The present study aimed to assess the effect of reflection-based education on the thinking skills and performance of dental students.

Materials & Methods: This is a quasi-experimental study. A total of 34 dental students that passed basic science courses and entered the clinical departments have participated. Educational interventions based on Gibbs' reflection model were conducted through educational workshops and workplace-based education. The reflective thinking of students was assessed by a 16-item questionnaire in four domains of habitual performance, understanding, reflection, and critical reflection. The students' performances were assessed by an observational examination. Data were analyzed by descriptive and analytical tests in SPSS ver.17. The significance level was P-value≤ 0.05.

Results: The students' score of reflective thinking before the educational intervention was 14.48±2.73 and after the training was 15.35±1.33. There were significant differences in the scores of the reflection domain before and after educational interventions. (p-value=0.01). The learning scores of students were reported 17.56 that significantly higher than the minimum pass level. (P-value=0.01).

Conclusion: Reflection-based education decreases the level of habitual performance and increases reflection among dental students. Therefore, it is recommended that reflection as a main component of clinical education throughout the practical courses be considered in dental schools.

Keywords: Reflection, Dental Student, Dentistry, Reflection Based Education

Introduction

Reflection was recognized as a key factor in the learning process (1, 2). Reflection is defined as a metacognitive phenomenon that occurs before, during, and after learning and doing the practical processes. The purpose of reflection is to improve the understanding of a topic or situation, which leads to more accurate decision-making in the future (1, 2). The models and theories such as Schon's reflection model, Mezirow's learning theory, and experimental learning cycle explained the process of reflection (1 and 3-5).

These models acknowledged acquiring knowledge, information, skills, and clinical experiences is not enough in the process of clinical education (6). Therefore, reflection, analyzing educational findings, and practicing are considered the most basic concepts in the learning process (1-2, 7). In clinical fields, there is a significant relationship between reflection on students' learning and their clinical performance (8 and 9). A fundamental problem in the deep learning of learners has described their weakness in applying

[DOR: 20.1001.1.29807670.2023.16.49.1.2]

[DOI: 10.52547/edcj.16.49.1]

previous learning in the clinic, and lack of reflection about previous experiences with the patient.

As long as the students only rely on their knowledge and do not reflect on their previous learning, they cannot understand deeply the educational content and applications of their knowledge in providing healthcare services (1, 3). Reflection is a main component of teaching and learning in clinical teaching, and various educational strategies and methods can be used to develop the reflection ability of learners (11 and 12). The purpose of reflection during training is to deepen inclusive learning and ultimately improve their clinical practice (2 and 3). Reflection as a metacognitive process can occur before, during, or after encountering learning situations such as the patient's bedside. The students should integrate their knowledge with what dealing with in the real environment, it leads to deep learning and performance improvement (5). The best time to think and reflect on educational findings in the clinical field is when facing the patient and dealing with clinical challenges (10). According to Donald Schon's theory, "reflection" can be done during the performance (Reflection-in-action) and after the performance (Reflection-on-action). Reflection can be effective in identifying students' problems and ambiguities and improving their performance (4). Reflection as a main tool in the learning process improved learners' self-efficacy (1-2, 13). In the process of clinical education, the methods such as storytelling methods, group discussions, flashcards, portfolios, and strategies such as providing feedback and creating a mechanism for reflection can help in the process of reflection and improving the learning of students (13).

The diagnostic skills of students in dentistry play an important role in the desired performance of students. The development of the reflective ability of students needs active engagement of them in reflection-based opportunities before, during, and after performing clinical activities (10 and 13). In the field of dentistry, due to encountering students with a stressful and challenging environment during the treatment of patients, the use of reflection as an educational strategy was recommended (14). Root canal treatment is one of the most challenging in dental science, and the need to use diagnostic skills and previous experiences in managing patients (24). Despite the emphasis on reflection as a skill for students of medical sciences, this topic has been neglected in dental schools (15 and 16). The use of the reflection-based education method helps the students to institutionalize their reflective ability and improve their skills in providing healthcare services (12, 15). The present study aimed to assess the effect of reflection-based education on the reflective ability and performance of dental students.

Materials and Methods

Design and setting(s)

This is a quasi-experimental study.

Participants and sampling

The participants were dental students who had passed the basic science course and were entering clinical departments. All dental students (n=34) who entered the Endodontics department for the first time were included in the study as a census.

Data collection methods

The educational intervention was carried out in two steps. Educational interventions were carried out through educational workshops and workplace-based education according to Gibb's reflection model. Gibbs' reflection model consists of six steps, which are: 1) Description of the experience, 2) Feelings and thoughts about the experience, 3) Evaluation of the experience, both good and bad, 4) Analysis to make sense of the situation, 5) Conclusion about what you learned and what you could have done differently, 6) Action plan (17).

In the first step, the training workshop aimed to familiarize the students with the principles of reflection and practice the structured reflection process in small groups. The students were asked to reflect on the activities they experienced last week. The students individually completed the semi-structured form of reflection, which was designed based on the Gibbs model. Next, the students in small groups reviewed each other's reflection forms and discussed them. The facilitator reviewed all the students' forms and gave them constructive feedback.

In the second step, reflection was considered in the process of workplace-based education. In the clinical training, the supervision and feedback by the facilitator were emphasized. After the practical activities in the clinical department, the students were asked to complete the structured reflection form designed based on the Gibbs model. The feedback was written in the students' portfolios by the facilitator. Also, the students who needed more support were determined and used supportive supervising in the workplace-based learning

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[DOI: 10.52547/edcj.16.49.1]

process. Feedback sessions were held. The group reflection sessions were held in small groups to share the experiences of students concerning their activities in the clinical department at the weekend. In these meetings, each of the students in small groups chose one of their experiences and discussed it in the small group. Other members of the group analyzed the problem and solutions. Finally, each case is summarized by the facilitator.

In the process of educational intervention, the clinical teacher played the role of facilitator and feedback provider. The teacher in the clinical department facilitated the students' learning process by directly observing and providing feedback. Also, the clinical teacher directed the group discussion and reflection process of students, as well as providing feedback and summarizing in small groups.

Tools/Instruments

To measure the thinking ability of students, a reflective thinking questionnaire developed by Kember, was used (18). The questionnaire was validated in the previous study by Kazemipoor et al. (Cronbach's alpha 0.78) (16). The questionnaire consisted of 16 items and was designed in four domains including "habitual performance", "understanding", "reflection" and "critical reflection" (18). Each domain consisted of 4 items. The scoring was conducted by five options including from 1 (completely disagree) to 5 (completely agree). The minimum score was 16 and the maximum score was 80. The students were asked to complete the questionnaire before and after the educational intervention by self-assessment.

The learners' performance was evaluated using an observational examination. Each student performed a root canal treatment of a patient. Students' skills in root canal treatment and patient management were assessed using a 16-question checklist in various areas, including collecting information necessary to diagnose the problem, providing a suitable treatment plan, the process of performing root canal treatment, observing the principles of infection control, and educating the patient. At the end of the course, the satisfaction of the students was assessed in the range of 0-100.

Data analysis

Data were analyzed through descriptive tests (mean, standard deviation, and percentage) and analytical tests (one-sample t-test and student pair t-test) in SPSS software version 17.

Results

In the present study, 34 dental students, including 23 women (67.6%) and 11 men (32.4%), with a mean age of 22.94±2.36 (age range 25 to 22) participated. The students' score of reflective thinking before the educational intervention was 14.48±2.73 and after the training was 15.35±1.33. (Table 1). There is a statistically significant difference between the students' scores before and after the educational intervention (P-value=0.01), which indicates the positive effect of the training on improving the students' reflective scores. The scores of the "understanding" and "critical reflection" domains of the learners improved after the educational intervention, although this difference was not significant (P<0.05). The scores of the "habitual performance" domain also decreased after the intervention, but this difference was not significant(P<0.05). (Table 1).

Table 1. The dental students' scores in domains of reflective thinking

Domains	Mean(SD)	Mean(SD)	P-value
Habitual Performance	10.18 (2.83)	8.47 (2.22)	0.06
Understanding	16.53 (2.21)	17.18 (1.55)	0.33
Reflection	18.76 (1.26)	18.29 (1.26)	0.01**
Critical Reflection	14.47 (1.74)	15.53 (1.73)	0.14
Total	57.94 (3.04)	59.29 (4.40)	0.01**

** P-value< 0.05 is significant

The results indicated no statistically significant difference was observed between the scores of women and men in the domains of reflective thinking (P<0.05). However, the scores of the domains of " habitual performance", "understanding" and "critical reflection" were higher in women, and the score of the "reflection" domain was higher in men.

78% of the students were satisfied with the reflection-based education. The score of the observational examination was 17.56±2.3, which was significantly higher than the minimum passing score (12) in the observational test. (P=0.01).

Discussion

In the present study, the educational intervention was designed to guide reflection in the clinical learning process. In this study, the clinical education method based on reflection was used as an educational strategy in the Endodontics department. For this purpose, a structured reflection form was completed by the students after each educational session, which facilitated reflection on action. The present results

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showed that education according to reflection and structured guidance in workplace-based education led to the growth of students' thinking skills and performance. Similarly, the results of Neville's study showed that reflection on action among students had a significant impact on the quality of inclusive learning (14). Brindley showed the significant effect of reviewing and reflecting on the promotion of personal and professional behavior in the dental training course. This study showed the integration of their experienced performance, views, and values assisted the reflection process (19).

The student's scores in the domain of "habitual performance" have decreased significantly. "Habitual performance" includes all the actions of practitioners, which are performed automatically based on the person's previous learning. They repeated their practice without any revision and reflection (20). The decrease in the students' habitual performance had a positive effect on improving students' ability in the reflection process. Moreover, the student's scores in the domain of reflection increased significantly. In the domain of "reflection", comprehensive thinking is emphasized in the form of accurate, permanent, and active evaluation while solving the problem. The results confirmed the positive effect of training based on reflection in the workplace on students' reflection skills.

The results showed that the learners' scores in the "understanding" and "critical reflection" domains improved after the educational intervention. The domain of "understanding" addressed the activities that were important to memorize the educational content by the learner in 'rote learning' and without reflection and review of what was learned. This type of learning leads to superficial learning. The domain of "critical reflection" includes a higher level of learning, awareness of performance, perception, and feeling (21). The insignificance of students' scores in the domain of "understanding", "critical reflection" and "habitual performance" after the educational intervention can be caused by the shortened time of the educational intervention. The results of Benade show that significant behavior changes require longitudinal educational interventions to institutionalize a behavior (22). The results of Tricio and colleagues showed that the highest score was in the domains of understanding and reflection (12). The reason for the difference in students' scores in the present study and Tricio et al.'s study is the characteristics of the studied community. In Tricio's study, students from the first to the fifth year of dentistry and dentists in this field were examined, while in the present study, only the students of the 7th semester were evaluated. Considering the different age groups of the students in the two studies and the different levels of encountering challenges in clinical treatments justified this difference. Critical reflection is the highest level in the learning process and is formed in multiple encounters with complex clinical cases. Therefore, creating this skill requires obtaining experience, increasing clinical experience, and continuous practice. Similar to the present study, Keshmiri et al., was used the reflection base on the Gibbs model, which used the reflection in small groups and workplace-based education in the nursing program. These results showed that the students were satisfied with the training course (23). Al-kofy and James used daily reflection in the process of teaching nursing students in the maternity department. These results showed that the learners' learning is improved with the help of reflection. They showed it is necessary to use reflective methods to increase clinical skills in the education of nursing students, especially in clinical education (24). The study of Kim and colleagues aimed to evaluate the impact of critical reflection on increasing critical reflection, job performance, and communication competence of novice nurses in clinical settings. In this study, the intervention group participated in reflection-based education and was encouraged to use the reflective approach during patient care. This study showed that the critical reflection of the participants had a positive effect on improving the nurses' performance for effective patient care (25). The results of Kim's study confirmed the development of the thinking skills of the participants and the improvement of their performance in providing health services that are similar to the present study.

The results showed no statistically significant difference was observed in any of the domains of reflection between male and female students. However, the scores of habitual performance, understanding, and critical reflection were higher in female students and the score in the reflection domain was higher in men students. In line with the present study, in the studies of Phan et al. (26) and Tricio et al. (12) who used the same questionnaire as the present study, no significant statistical difference was reported between the two genders in the four investigated domains.

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Conclusion

The present results showed that creating a structured opportunity for learners' reflection along with the workplace-based clinical education process has a positive effect on students' performance and thinking skills. Therefore, using reflection-based education for all dental education departments and providing feedback by the instructor was recommended to train capable dentists and improve the quality of dental clinical training.

Ethical Considerations

The present project has been approved by the Ethics Committee of Shahid Sadougi University of Medical Sciences, Yazd (ID: IR.SSU.REC.1399.104). At the beginning of the course, explanations were given to the students regarding the study's objective, and they completed the informed consent form.

Funding

This article is supported by the National Agency for Strategic Research in Medical Education. Tehran. Iran. Grant No.98140.

Conflict of interest

The authors declare that they have no conflict of interest.

Contribution of authors

F.K. conceptualized and designed the study, M.K. collected the data, and F.K. analyzed the data. F.K. and M.K. wrote the main manuscript text. The authors have met the criteria for authorship and had a role in preparing the manuscript. Also, the authors approved the final manuscript.

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

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