ORIGINAL ARTICLE

دور التقويم التكويني في استراتيجيات التعلم التنظيم الذاتي: دراسة شبه تجريبية

الخلفية: يعتبر التقييم أحد العوامل الفعالة في تشكيل كيفية تعلم الطلاب في التعليم العالي وترتبط جودة نتائج التعلم بجودة تقييم الطلاب. يقود التقييم التكويني المتعلمين إلى زيادة تعلمهم ويؤدي في النهاية إلى تحقيق إنجازات مناسبة للمتعلمين، بما في ذلك الإبداع والثقة والتحفيز اللازم للنجاح الأكاديمي. هدفت هذه الدراسة إلى التعرف على أثر التقويم التكويني في تطبيق استراتيجيات التعلم التنظيم الذاتي لدى الطلاب.

الطريقة: أجريت هذه الدراسة المقطعية شبه التجريبية على 68 طالب تمريض جامعي. تم إجراء امتحان تكويني للمجموعة التجريبية في نهاية كل شهر. أما المجموعة الضابطة فقد خضعت للاختبار النهائي فقط. تم تقييم استخدام استراتيجيات التعلم ذاتي التنظيم قبل وبعد التدخل في مجموعتين باستخدام استبيان الاستراتيجيات المحفزة للتعلم (MSLQ) الذي طوره Pintrich & De Groot . وأخيراً تم تحليل البيانات التي تم جمعها بواسطة برنامج SPSS.

النتائج: لم يكن هناك فرق كبير بين متوسط استخدام استراتيجيات التنظيم الذاتي في المجموعة الضابطة في مرحلتي ما قبل وبعد الاختبار (76.79±8.13 مقابل 77.17±3.33، p=0.921)، إلا أن المجموعة التجريبية أظهرت زيادة كبيرة في متوسط استخدام استراتيجيات التنظيم الذاتي بعد التدخل (94.26±6.44 مقابل 77.26±9.78، p<0.001). لم يكن هناك فرق ذو دلالة إحصائية في متوسط درجات مجموعتين قبل التدخل (p=0.89)، في حين أنه كان كبيرا بعد التدخل (p<0.001).

الاستنتاج: يمكن للتقييم التكويني أن يزيد بشكل كبير من استخدام استراتيجيات التعلم التنظيم الذاتي لدى الطلاب. بالإضافة إلى فعاليته الحاسمة لاستعداد الطلاب لإجراء الاختبار النهائي، فإنه يمكن أن يعزز مهارات التعلم المستقلة والموجهة ذاتيا.

الكلمات المفتاحية: التقييم، التقييم التكويني، التعلم التنظيم الذاتي، طالب التمريض، دراسة شبه تجريبية

The role of formative evaluation in self-regulation learning strategies: A quasi-experimental study

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Background: Evaluation is recognized as one of the effective factors in forming how students learn in higher education and the quality of learning outcomes is associated with the quality of student evaluation. Formative evaluation leads learners to increase their learning and ultimately results in appropriate achievements to learners, including creativity, confidence and motivation needed for academic success. This study aimed at investigating the impact of formative evaluation on applying self-regulation learning strategies by students.

Method: This quasi-experimental cross-sectional study was conducted on 68 undergraduate nursing students. A formative exam was performed for the experimental group at the end of each month. The control group was only subjected to the final exam. The use of self-regulation learning strategies was assessed before and after the intervention in two groups with Motivated Strategies for Learning Questionnaire (MSLQ) developed by Pintrich & De Groot. Finally the collected data were analyzed by SPSS.

Results: There was no significant difference between the mean use of self-regulation strategies in the control group in pre and post-test phases (76.79±8.13 vs. 77.17±3.33, p=0.921), however the experimental group showed a significant increase in the mean use of self-regulation strategies after the intervention (94.26±6.44 vs. 77.26±9.78, p<0.001). There was no statistically significant difference in the mean scores of two groups before the intervention (p=0.89), whereas it was significant after the intervention (p< 0.001).

Conclusion: Formative evaluation can significantly increase the use of self-regulation learning strategies in students. In addition to its crucial effectiveness for students' readiness to take the final exam, it can promote their independent and self-directed learning skills.

Keywords: Evaluation, Formative Evaluation, Self-regulation Learning, Nursing Student, Quasi-Experimental Study

خود ضابطہ سیکھنے کی حکمت عملیوں میں ابتدائی تشخیص کا کردار: ایک نیم تجرباتی مطالعہ

پس منظر: اعلیٰ تعلیم میں طلباء کیسے سیکھتے ہیں اس کی تشکیل میں تشخیص کو ایک مؤثر عوامل کے طور پر تسلیم کیا جاتا ہے اور سیکھنے کے نتائج کا معیار طلباء کی تشخیص کے معیار سے وابستہ ہے۔ اس مطالعہ کا مقصد طلباء کی طرف سے خود ضابطہ سیکھنے کی حکمت عملیوں کو لاگو کرنے پر ابتدائی تشخیص کے اثرات کی تحقیقات کرنا ہے۔

طریقہ: یہ نیم تجرباتی کراس سیکشنل مطالعہ 68 انڈرگریجویٹ نرسنگ طلباء پر کیا گیا تھا۔ تجرباتی گروپ کے لیے ہر مہینے کے آخر میں ایک ابتدائی امتحان لیا جاتا تھا۔ کنٹرول گروپ کو صرف آخری امتحان سے مشروط کیا گیا تھا۔طریقہ: یہ نیم تجرباتی کراس سیکشنل مطالعہ 68 انڈرگریجویٹ نرسنگ طلباء پر کیا گیا تھا۔ تجرباتی گروپ کے لیے ہر مہینے کے آخر میں ایک ابتدائی امتحان لیا جاتا تھا۔ کنٹرول گروپ کو صرف آخری امتحان سے مشروط کیا گیا تھا۔

نتائج: کنٹرول گروپ میں پہلے اور ٹیسٹ کے بعد کے مراحل (76.79±8.13 بمقابلہ 77.17±3.33، p=0.921) میں کنٹرول گروپ میں سیلف ریگولیشن کی حکمت عملیوں کے اوسط استعمال کے درمیان کوئی خاص فرق نہیں تھا، تاہم تجرباتی گروپ نے نمایاں اضافہ دکھایا۔ مداخلت کے بعد سیلف ریگولیشن کی حکمت عملیوں کے اوسط استعمال میں (94.26±6.44 بمقابلہ 77.26±9.78، p<0.001)۔ مداخلت (p = 0.89) سے پہلے دو گروپوں کے اوسط اسکور میں اعداد و شمار کے لحاظ سے کوئی خاص فرق نہیں تھا، جبکہ یہ مداخلت کے بعد اہم تھا (p< 0.001)۔

نتیجہ: تشکیلاتی تشخیص طلباء میں خود ضابطہ سیکھنے کی حکمت عملیوں کے استعمال میں نمایاں اضافہ کر سکتی ہے۔ فائنل امتحان دینے کے لیے طلباء کی تیاری کے لیے اس کی اہم تاثیر کے علاوہ، یہ ان کی خود مختار اور خود ہدایت سیکھنے کی مہارت کو فروغ دے سکتا ہے۔

مطلوبہ الفاظ: تشخیص، تشکیلاتی تشخیص، خود ضابطہ سیکھنا، نرسنگ طالب علم، نیم تجرباتی مطالعہ

نقش ارزشیابی تکوینی در استراتژی های یادگیری خودتنظیمی: یک مطالعه نیمه تجربی

زمینه و هدف: ارزشیابی به عنوان یکی از عوامل مؤثر در شکل‌گیری نحوه یادگیری دانشجویان در آموزش عالی شناخته می‌شود و کیفیت نتایج یادگیری با کیفیت ارزشیابی دانشجویان مرتبط است. ارزشیابی تکوینی، فراگیران را به سمت افزایش یادگیری سوق می-دهد و در نهایت دستاوردهای مناسبی برای یادگیرندگان از جمله خلاقیت، اعتماد به نفس و انگیزه مورد نیاز برای موفقیت تحصیلی به همراه دارد. این پژوهش با هدف بررسی تأثیر ارزشیابی تکوینی بر بکارگیری راهبردهای یادگیری خودتنظیمی توسط دانشجویان انجام شد.

روش: این مطالعه نیمه تجربی بر روی 68 دانشجوی کارشناسی پرستاری انجام شد. در پایان هر ماه یک آزمون تکوینی برای گروه مداخله انجام شد. گروه کنترل تنها تحت آزمون پایانی قرار گرفتند. استفاده از راهبردهای یادگیری خودتنظیمی قبل و بعد از مداخله در دو گروه با پرسشنامه راهبردهای انگیزشی برای یادگیری (MSLQ) تهیه شده توسط پینتریچ و دی گروت ارزیابی شد. در نهایت داده‌های جمع آوری‌شده با استفاده از نرم افزار SPSS مورد تجزیه و تحلیل قرار گرفت.

یافته‌ها: میانگین استفاده از راهبردهای خودتنظیمی در گروه کنترل در مرحله پیش و پس‌آزمون تفاوت معنی‌داری نداشت (76.79±8.13 در مقابل 77.17±3.33، p=0.921). اما گروه مداخله افزایش معنی‌داری نشان داد. میانگین استفاده از راهبردهای خودتنظیمی پس از مداخله (94.26±6.44 در مقابل 77.26±9.78، p<0.001). میانگین نمرات دو گروه قبل از مداخله از نظر آماری معنی‌دار نبود (p= 0. 89) در حالی که بعد از مداخله تفاوت معنی‌داری داشت (p<0.001).

نتیجه‌گیری: ارزشیابی تکوینی می‌تواند استفاده از راهبردهای یادگیری خودتنظیمی را در دانشجویان افزایش دهد. علاوه بر اثربخشی حیاتی آن برای آمادگی دانشجویان برای شرکت در امتحانات پایانی، می‌تواند مهارت‌های یادگیری مستقل و خودگردان آنها را ارتقا دهد.

واژه های کلیدی: ارزشیابی، ارزشیابی تکوینی، یادگیری خودتنظیمی، دانشجوی پرستاری، مطالعه نیمه تجربی

INTRODUCTION

Evaluation is a systematic process used to collect, assess and analyze data. It generally answers the question of whether predetermined objectives have been achieved or are being achieved (1). In the learning-teaching process, evaluation is also considered as one of the essential factors with various uses and objectives. For example, based on the results, we can be informed to what extent educational goals are achieved and identify the strengths and weaknesses of the learners in various aspects and take measures to strengthen or remove them. In this regard, student assessment as one of the sub-categories of evaluation theme in educational activities is considered as the most important factor in academic education (2, 3).

In general, student evaluation has two common approaches: 1. Summative evaluation that is common , and is done after the program is over and includes specific objectives, such as assessing the meeting educational goals, making decision for learners, etc. (4); 2. Formative evaluation which occurs while a training program and learners' learning is forming or occurring. The goal of formative assessment is to monitor student learning to provide feedbacks about their strengths and weaknesses and also to identify problems with the teaching method with regard to the educational goals (5). In fact, formative assessment, by assessing the current learning status, acts as a guide for students and helps them to improve their learning performance and academic qualifications (6, 7). The results of formative evaluation will provide an effective motivation for learning new content and it also can enhance the sense of accomplishment of learners who have met all learning goals (8). High quality formative evaluation leads learners to increase learning and promotes some outcomes, such as creativity and confidence in learners (4, 9). Accordingly, a step by step learning progress can be one of the most important applications of formative evaluation (4).

Promoting and improving learning essentially is the main goal of all educational activities, including formative evaluation. However, active participation of students in teaching-learning processes has been emphasized in recent decades. So that, formative evaluation is crucial for promoting and enhancing effective learning and various strategies have proposed to institutionalize this type of learning (10). In fact, active learning is using a set of strategies that empower the learner to participate in learning and enable him/her to deepen his/her learning (11). Self-regulation learning strategies are one of the strategies in promoting and institutionalizing active learning by students. These strategies are among the strategies and approaches that can be used to activate student learning. In other words, self-regulation learning is an organized and active process, in which learners consider learning goals, followed by trying to adjust, control, and supervise their own cognitions, motivations, and behaviors to achieve those goals (12). Self-directed or self-regulated learning skills and strategies are comprised of two major components. Cognitive strategies, which are learning strategies by facilitating learning process, improve students' academic performance and, meta-cognitive strategies that referring to a set of processes for planning, controlling, and modifying cognitive activities. In fact, they are the techniques that help learners to monitor their own processes of thinking while guiding their own mental processes in thinking and learning and remembering (13). Self-regulation learning is regarded as a requirement in medical education due to the need for independent and continuous learning. Since it is essential for the success of medical students in their professional performance to be updated in terms of knowledge and skills and also be self-directed in learning (14, 15). Nonetheless, several students are frustrated and hopeless due to lack of study and learning skills; however, if they use self-regulation learning strategies, they can succeed. In fact, medical students can improve their academic achievement by better understanding of the self-regulation learning. In other words, using self-regulation learning strategies is a useful tool in solving academic problems and helping students develop the needed skills through their academic years. Identification and reinforcement of these strategies help learners by relying on their abilities and through discovering and strengthening of those abilities, complete their university education successfully (16, 17).

In this regard, various studies have been conducted to promote active learning and self-regulation learning in students, focusing mainly on educational approaches and using participatory teaching methods (18-20). It should be noted that these efforts to promote self-regulation learning in medical students have associated with relatively success (14, 15). This consideration into account and also since active learning is not an individual subject and entirely dependent on individual abilities, and the employed conditions and methods in teaching-learning processes can lead to its enhancement and development (11); and also since most relevant studies were done on the impact of different teaching methods on promoting self-regulation learning skills, this study aimed at investigating the impact of formative evaluation on students' self-regulation learning strategies considering that formative evaluation as an important factor in the student learning process.

METHODS

Study design and participants

This quasi-experimental study using two groups was performed in Tehran University of Medical Sciences, Iran. The study population consisted of all third year nursing students (N=68) studying in two separate classes of 34 students. One of the classes was randomly assigned as the experimental group and another one as the control group. The subject was critical care nursing (CCU). Inclusion criteria was studying this course for the first time; however, being absent in any of formative exams that have arranged at the end of each month was considered as an exclusion criteria. All students were enrolled in this course for the first time and no attrition was happened due to exclusion criteria.

Survey description

The dependent variable was students' self-regulation learning strategies, which was assessed by the Motivated Strategies for Learning Questionnaire (MSLQ) developed by

Pintrich & De Groot in 1990 (21). This two-part questionnaire addresses using self-regulation learning strategies and motivational beliefs on a five-point Likert scale. In this study, self-regulation learning strategies section was used with 22 items in two dimensions, including cognitive strategies (Repeating-Notation-Summary-Organizing-Understanding) and metacognitive strategies (Planning-supervision and control-effort and perseverance-regulation). The minimum and maximum scores were 22 and 110, respectively, and a higher score represents more use of self-regulation learning strategies. The validity and reliability of MSLQ were assessed by its developers and the reliability of the cognitive and metacognitive strategies dimensions obtained 0.83 and 0.74, respectively (21). MSLQ has been translated into Persian by different researchers and its validity and reliability have been confirmed (22-24).

Study procedure

The study was done in two groups in pre and post-test phases. Each group was filled MSLQ questionnaire before starting the study as pre-test. Then, the control group was taught about critical care nursing for four months in 16 sessions. At the end of the course, they participated in final exam. No formative evaluation was considered for the control group and the students were only evaluated by the final exam. In the experimental group, a written exam was taken after each four sessions. Accordingly, four formative exams (once a month) were held during the course. The formative exams were written exam in the form of multiple choice, short answer and matching questions, in addition to 3-5 explanatory questions at the end. The questions were developed to evaluate different levels of cognitive learning domain of the students including knowledge, comprehension, application, and analysis. After completing the study, all students in both groups were completed MSQL again (post-test). To reduce the effect of external variables on the results, all conditions were controlled to be similar between two groups such as the content, the teaching method, and the teacher that were the same for the control and experimental groups.

Statistical analysis

Finally, the collected data were analyzed by SPSS, version 16. Significance level was considered 0.05 and the normal distribution of data was confirmed by Kolmogorov–Smirnov test. Analysis was done by paired and independent T test to compare the results inter and between groups, respectively. This research was a single-blinded study regarding data collection and analysis and the questionnaires were collected and analyzed by persons who were not aware of the study objectives and groups.

RESULTS

In this study, the majority of students were female (65.17%) and single (82.35%) with the mean age of (22.88±2.99) and there was no significant difference between two groups in terms of demographic characteristics and both groups we homogenized (Table 1).

The results showed that the mean score of self-regulation learning strategies in the control group in post-test was 77.17±3.33, which did not show a significant increase compared to pre-test ($p=0.92$), whereas in the experimental group, the mean score of self-regulation learning strategies was 77.26±9.78 before the intervention and 94.26±6.44 after the intervention, which was statistically significant ($p<0.001$) (Table 2).

In addition, the difference in the mean scores of two groups before the intervention was not statistically significant ($p=0.89$), however this difference was significant after the intervention ($p<0.001$) (Table 3).

DISCUSSION

In this study, the experimental group showed a significant increase in using self-regulation strategies according to the statistical results and comparison of the mean scores of MSQL before and after the intervention. It means formative

Table 1. Characteristics of the students who participated in the study

Characteristics		Frequency (%)		P value
		Control group	Experience group	
Age (Year)	≤ 21	9 (26.5%)	6 (17.6%)	t = 1.302
	22-23	20 (58.8%)	22 (64.7%)	P = 0.197
	≥ 24	5 (14.7%)	6 (17.6%)	
Gender	Female	22 (64.7%)	23 (67.6%)	X^2 = 2.96
	Male	12 (35.3%)	11 (32.4%)	P = 0.080
Marital status	Single	29 (85.3%)	27 (79.4%)	X^2 = 0.135
	Married	5 (14.7%)	7 (20.6%)	P = 0.713
Living place	Dorm	9 (26.5%)	9 (26.5%)	X^2 = 0.234
	With family	24 (70.6%)	25 (73.5 %)	P = 0.629
	Alone	1 (2.9%)	0 (0.0 %)	
Employment status	No	19 (55.9%)	20 (58.80%)	X^2 = 0.128
	Yes	15 (44.1%)	14 (41.2%)	P = 0.641

evaluations resulted in improvement of self-management and self-regulation of students in the regard of their learning process. Basically, student evaluation is a technique, by which the students' learning status can be determined (25) and it helps to be informed what and how has learned by the student and also its quality (26). In the formative evaluation, using data collection, evaluation and analysis, we can make decision and plan to improve or eliminate deficiencies and weaknesses of teaching-learning practices, so this type of evaluation, as it has reported in various studies, has a significant impact on students' learning. For example, Srivastava et al. (2018) conducted a study aimed at investigating the impact of formative evaluation techniques in the classroom on better learning of first year medical students. The results showed that the learning scores in the experimental group were higher than the control group, which had experienced the regular evaluation methods, and there was a significant difference between two groups after the intervention ($p<0.01$). The researchers mentioned that formative evaluation can be used as a useful and practical strategy for identifying learning issues, tailor instructional modifications, and timely feedback to promote students' learning (27). In another study by Carrillo et al. (2009) on formative evaluation and academic success of health science students, they found that students who were subjected to the formative evaluation including short-answer and multiple-choice questions had greater learning scores and better academic achievement (28).

Accordingly, formative evaluation is one of the effective strategies for improving students' learning and academic success. It should be noted that self-directed and self-regulation in learning are as the needed learning abilities for learners which can lead to the improved learning and academic success. In this regard, over the last few decades, efforts have been made to enhance the use of self-regulation and self-directed learning among students through different and multiple interventions in the education system (7). In this respect, the present study showed that formative evaluation can enhance students' self-regulation learning skills, since the mean score of the use of self-regulation learning strategies in the experimental group (subjected to the formative evaluation) was significantly higher than the control group, who experienced only final exam. Also, Nicol and Dick's study (2006) indicated that formative evaluation provides students with opportunities for self-regulation learning leading to the increased levels of learning (29). In fact, self-regulation learning is the ability of learners to understand and control their own learning. In other words, learners try to evaluate their learning behavioral effects and organize their learning conditions, so that their behaviors and efforts are more productive (30). Therefore, formative evaluation can lead students to keenly and intentionally use appropriate learning strategies to improve their learning performance by informing about their learning status. Al Kadri et al. (2011) in a study on learners' perspective on the effect of evaluation in learning concluded that from the learners' perspective, effective evaluation is an appropriate way for adopting learning approach and motivating the learners (31). In fact, formative evaluation makes students more active and increases their motivation to learn (32). It also leads them to use self-regulation learning strategies, which are actively and consciously use of appropriate learning strategies including a range of complicated activities to achieve learning goals (33).

In this regard and based on the results of the present study, professors are recommended to use formative evaluation which has less practically regarded and as a result, help to enhance learners' participation and independence in learning process resulting in learning improvement and academic success in their education and future career. Heads of departments, curriculum planners, and other university officials are also suggested to pay more attention to the formative evaluation and include it in policies and educational operational programs, as well as through taking necessary measures, provide the context and facilities for obligatory organized and structured performing of the formative evaluation, like the summative exams.

The small sample size was one of the limitations of this study, so it is recommended to conduct the study using a larger sample size for better generalizing. Moreover, written exam was used for formative evaluations, it is suggested that in future studies, the impact of different types of tests such as oral exams or the quantity of formative tests be investigated on students' self-regulation learning strategies.

Table 2. Comparison of self-regulated learning strategies before and after the intervention

Group	Phase	Mean(SD)	P value
Control	Before	76.79(8.13)	t = - 0.099
	After	77.17(3.33)	P = 0.921
Experience	Before	77.26(9.78)	t = -5.977
	After	94.26(6.44)	P = 0.000

Table 3. Comparison of mean differences of students' self-regulated learning strategies in two groups

Group	Control	Experience	Mean Difference (SD)	P value
Before	76.79 ± 8.13	77.26 ± 9.78	Before: 0.47 (1.65)	t = -0.096
				P = 0.891
After	77.17 ± 3.33	94.26 ± 6.44	After: 17.09 (3.11)	t = - 6.726
				P = 0.000

CONCLUSION

Conducting formative evaluation can significantly increase using self-regulation learning strategies in students. Accordingly, since formative evaluation has been overlooked in learning practices especially in higher education, it is necessary to be paid more attention by taking some measures and the professors should be obliged to perform this type of evaluation. So, it can lead to students' success in final exam, as well as improve their skills in regulation of their learning strategies that play a key role in the development of continuous, independent, and lifelong learning.

Ethical Considerations: Ethical issues including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc. have been completely observed by the authors. The study was approved by ethical committee of Shahid Beheshti University of Medical Sciences (IR.SBMU.RETECH.REC.1396.581) and essential permissions were obtained to collect data.

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