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# *The Effect of Formative Evaluation on Test Anxiety of Nursing Students*

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**Abstract**

**Background and Objective:** Assessment is recognized as one of the effective factors in the learning of students in higher education. In addition, the quality of learning outcomes depends on the quality of the evaluation. However, assessment can have negative effects on individual performance due to its association with test anxiety. This study aimed to evaluate the effect of formative evaluation on test anxiety of students.

**Materials and Methods:** This quasi-experimental study was conducted on 68 nursing students and contained two groups, before and after the procedure. In the intervention group, a formative test was held every four weeks. However, subjects of the control group took only one final exam. In addition, the level of test anxiety of the participants was measured before and after the intervention using motivated strategies for learning questionnaire by Pintrich and De Groot. Data analysis was performed in SPSS version 16.

**Results:** In this research, mean and standard deviation of anxiety in the control group significantly increased from 18.5±08.63 before intervention (pretest) to 24.96±2.37 after the intervention (posttest) (P=0.001). In the interevention group, mean and standard deviation of test anxiety significantly reduced from 13.72±3.31 before the intervention to 18.5±08.56 after the intervention (P=0.001). While the comparison of mean score of test anxiety of both groups before the intervention revealed no significant difference (P=0.87), there was a significant difference between the groups after the intervention (P=0.001).

**Conclusion:** According to the results of this study, performing formative evaluation can help test anxiety control of students. In addition to the important effect of formative evaluation on learning of students, this process prevents the effect of negative outcomes of anxiety on the actual performance of students.

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**Introduction**

As one of the subsets of evaluation theme in educational activities, assessment of students is among the most important pillars of academic education (1). Generally, evaluation is recognized as one of the effective factors for shaping the learning of students in higher education, and the quality of learning outcomes depends on the quality of evaluation (2). In addition, the importance of student assessment is due to its various consequences. In fact, effective assessment of students not only plays an important role in the screening of students but also increases learning motivation in these individuals and helps the instructor to evaluate his own activities as well (3). Since ancient times, the issue of performance assessment of learners has been discussed in educational systems. The significance of this phenomenon is due to the fact that acquisition of knowledge and skill is considered a gradual and hierarchical matter in educational systems. On the other hand, evaluation of academic performance of students over a linear and parallel process will provide feedbacks for these individuals, in a way that their future performance could be affected by this process (4).

However, it should be noted that there are some barriers to achieving these outcomes, one of which is test anxiety. Generally, test anxiety is a common phenomenon among students and is regarded as one of the problems of the educational system (5). In fact, test anxiety is a specific type of stress, which is determined by physical, cognitive and behavioral signs when preparing for exams. However, it turns into a problem when a high level of anxiety interferes with test preparation and performance. Test anxiety appears in students when they know that their performance will be assessed (6). This phenomenon is associated with some consequences, including affecting the academic performance of students. For instance, in a research in University of Engineering and Technology, Lahore, Pakistan, a reverse relationship was found between the scores of academic performance and test anxiety (7). In actuality, test anxiety distracts students and leads to their academic dropout by distracting students and reducing their data processing skill (8). Therefore, it seems that there is a need for solutions to control and reduce test anxiety in students since it is not possible to completely eliminate evaluation from educational programs. In contrast, we need to control possible negative outcomes of this area. In this respect, various solutions have been recommended by

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researchers. Some of the measures taken to control this factor include strengthening counseling offices in universities by recruiting specialized workforce, providing psychological and counseling services to students, and striving to create a close relationship between students and counselors (9). Meanwhile, function, position, and type of evaluation (e.g., formative evaluation) itself has not been assessed in control of negative outcomes of test anxiety (10).

In general, formative evaluation is an important topic in students' education due to providing beneficial information, which determines the performance of learners so that they could assess their own progress. Moreover, this type of assessment helps professors recognize the learning strengths and weaknesses of students (10). In other words, formative evaluation is systematic assessment interventions performed during the course of education to provide the necessary cognitive and motivational support for learning in students. In addition, the main goal of formative evaluation is the improvement of mental abilities of students to detect their weaknesses and strengths and advance their learning (11).

Therefore, one of the most important applications of formative evaluation is aiding step-by-step learning. In other words, learning of contents of an educational subject is carried out through various stages, where learning previous units is essential for full comprehension of following units. With that notion, results of the formative evaluation will be extremely effective motivation for learning new contents, improving the feeling of success in those who can fully learn a topic (1). On the other hand, formative evaluation can be associated with positive outcomes for students, such as creativity, self-confidence, and improvement of self-directed learning (11). Given the importance and applications of formative evaluation, and with regard to high anxiety level associated with final exams, which can have negative impacts on the performance of individuals, this study aimed to determine whether the formative evaluation can normalize the evaluation process and reduce test anxiety in students.

## Materials and Methods

This quasi-experimental study was carried out in the nursing and midwifery school of Tehran University of Medical Sciences in the second semester of 2016-2017. This study contained two before and after groups. Research setting was in Tehran University of

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Medical Sciences, Tehran, Iran. The study population included all BSc nursing students (sixth semester), who had the theoretical course of nursing in coronary care unit (CCU). Given the limited nature of the research population, census method was used for sampling, and the research population was equal to sample size (68 students in two 34-member classes). One of the classes was randomly selected as the intervention group and the other group was recognized as the control group. The inclusion criterion was being a BSc student in the field of nursing. On the other hand, exclusion criterion was lack of ability to pass the CCU unit in previous semesters, which was observed in none of the subjects.

Data collection was carried out using the motivated strategies for learning questionnaire (MSLQ) by Pintrich and De Groot, which has two main subscales, including self-regulatory learning strategies and motivational beliefs. In the former subscale, test anxiety is assessed with the aid of seven items, which are scored based on a five-point Likert scale (completely agree=5, agree=4, no opinion=3, disagree=2, and completely disagree=1). The minimum and maximum scores of the questionnaire are 7 and 35, respectively, where the higher score is indicative of greater test anxiety. Psychometric analysis of the applied questionnaire was previously carried out in a research by Barrows, and the reliability of the tool was confirmed through internal correlation and estimation of Cronbach's alpha, which was calculated at 0.75 for the subscale of test anxiety (12). In Iran, the validity and reliability of the mentioned questionnaire were confirmed by Vahedi et al. (Cronbach's alpha=0.8) (13).

After receiving the ethical approval from Shahid Beheshti University of Medical Sciences with the code of IR.SBMU. RETECH.REC.1396.581 and written permission from Tehran University of Medical Sciences as the research setting, the researcher made the necessary arrangements with the instructor of CCU course and explained about the objectives of the research. In addition, informed consent was obtained from the instructor prior to the study. There were two independent classes for teaching the CCU course, which were randomly divided into two control and intervention groups. At first, data related to the stage of pretest were collected by distributing the questionnaires among students. It should be noted that the research objectives were explained to the subjects in order to adhere to ethical

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considerations by the researcher. In addition, the subjects were ensured of the confidentiality terms regarding their personal information. Following that, four formative written exams were held for students of the intervention group during the academic semester to cover the training CCU topics. In this respect, an exam was taken after each four training sessions. On the other hand, no formative evaluation was carried out on the subjects of the control group during the academic semester, and evaluation of students was carried out through holding the final exam. At the end of the academic semester and one week before the final exam, the questionnaires were re-distributed among the participants. Data analysis was performed in SPSS version 16 using descriptive statistics (e.g., frequency distribution, absolute and relative, and mean and standard deviation), as well as paired and independent t-tests to compare results of the study groups before and after the intervention and results between the groups, respectively. P-value of 0.05 was considered significant. It is noteworthy that this was a single-blind survey, in a way that data were collected and analyzed by a person, who had no knowledge about the division of subjects into the intervention and control groups. One of the major limitations of the study was the long duration between filling the anxiety questionnaire from the stage of before the intervention to the final exam, which might have affected the demonstration of the actual level of test anxiety of students. However, this limitation was controlled through having two groups and comparing their results.

**Results**

In this study, the normality of the research population was evaluated and confirmed using Shapiro–Wilk test, followed by the application of parametric tests. Results obtained from the analysis of the data related to the demographic characteristics of the subjects, showed no statistically significant difference between the groups in terms of age (P=0.197), gender (P=0.08), marital status (P=0.71), place of residence (P=0.62), occupation associated with education (P=0.64), and probation status (P=0.07). In other words regarding the demographic characteristics, both study groups were homogenous (Table 1).

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***Table 1: Frequency of students' characteristics***

| Variable | Group | Control | Intervention | Results |
|---|---|---|---|---|
| | | N (%) | N (%) | |
| Age (year) | ≤ 21 | 9(26.5) | 6(17.6) | p=0.197 |
| | 22-23 | 20(58.8) | 22(64.7) | |
| | ≥ 24 | 5(14.7) | 6(17.6) | |
| Sex | Girl | 22(64.7) | 23(67.6) | p=0.080 |
| | Boy | 12(35.3) | 11(32.4) | |
| Marital status | Single | 29(85.3) | 27(79.4) | p=0.713 |
| | Married | 5(14.7) | 7(20.6) | |
| Place of residence | Dormitory | 9(26.5) | 9(26.5) | p=0.629 |
| | Parent's home | 24(70.6) | 25(73.5) | |
| | Alone | 1(2.9) | 0 | |
| Career status | No job | 12(35.3) | 13(38.2) | p=0.641 |
| | working as a student | 7(20.6) | 7(20.6) | |
| | Employing concurrently with studying | 15(44.1) | 14(41.2) | |
| Probation status | History of probation | 34(100) | 32(94.1) | p=0.079 |
| | No probation | 0 | 2(5.9) | |

According to the results, mean and standard deviation of test anxiety of the control group was 24.96±02.37 before the intervention (pretest), which significantly increased to 18.5±08.63, compared to the posttest (P=0.001). Meanwhile, mean and standard deviation of test anxiety was 17.87±05.56 in the intervention group before the intervention, which changed to 13.72±03.31, demonstrating a statistically significant difference in this regard (P=0.001). In other words, implementation of the formative evaluation decreased the mean of test anxiety of students, who had a lower anxiety level at final exam (Table 2).

*Table 2: Text anxiety of students before and after the intervention*

| Group | | Mean | Standard Deviation | Results |
|---|---|---|---|---|
| Control | Before | 18.08 | 5.63 | t=-6.459 |
| | After | 24.96 | 2.37 | p=0.001 |
| Intervention | Before | 17.87 | 5.56 | t=3.466 |
| | After | 13.72 | 3.31 | p=0.001 |

In addition, no significant difference was observed between the study groups regarding mean score of test anxiety before the intervention, which demonstrated the homogeneity of the groups in this respect (P=0.87). However, results of the independent t-test indicated a significant difference between the intervention (13.72±03.31) and control (24.96±02.37) groups in terms of the mean score of test anxiety after the intervention (P=0.001) (Table 3).

*Table 3: Comparison of students' test anxiety between control and intervention groups*

| Group | Control | Intervention | Results |
|---|---|---|---|
| Before | 18.08 ± 5.63 | 17.87 ± 5.56 | t=0.153<br>p=0.879 |
| After | 24.96 ± 2.37 | 13.72 ± 3.31 | t=9.508<br>p=0.001 |

## Discussion

According to the results of the current research, test anxiety significantly increased in students during the final exam, in a way that about half of the subjects (71%) had stress level above the average. In a research by Moore on 220 nursing students of State University, test anxiety was at a moderate-to-high level in 55% of the participants (14). In Iran, Darabi et al. evaluated the test anxiety of 170 students from various medical disciplines in Ilam University of Medical Sciences using test anxiety questionnaire. According to their results, 34.1% of the students had mild anxiety, whereas 51.8% and 14.1% of the subjects had moderate and severe anxiety at the time of final exam, respectively (9). Therefore, with regard to the negative impact of anxiety on the academic performance of students, various researchers have recommended differentstrategies to prevent or control test anxiety toevaluate the effects of thesetechniques on theanxietylevelof students. In the present study, the impact of formative



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evaluation on test anxiety was evaluated, demonstrating a statistically significant difference between the subjects of the intervention group, who were formatively evaluated, and participants of the control group in terms of test anxiety. It means that test anxiety significantly reduced in the intervention group, compared to the control group (P=0.001). In this regard, our findings are in congruence with the results obtained by Mirzaei et al., who conducted a research on BSc students of nutrition sciences (specifically the subject of pathophysiology of nutrition). According to the mentioned research, holding formative evaluations during the academic semester significantly reduced the anxiety level of students during the final exam (P=0.01) (16).

On the other hand, Farnia et al. conducted a research on fifth-grade students (subject of mathematics), demonstrating that formative evaluation not only had a positive impact on the academic progress of the subjects, but also significantly improved the performance of the participants during the final exam (P=0.001) and reduced their test anxiety (P=0.001) (17). In contrast, Jafaei Deloie et al. marked that unannounced formative evaluation had no impact on test anxiety of students of basic medical sciences, which is not in line with our findings (18). This lack of consistency between the results might be due to the unexpected holding of formative evaluations and lack of informing the students about this issue, which itself could be associated with some levels of anxiety. Meanwhile, formative evaluations were previously arranged and announced to students in the current research.

Given the prevalence of test anxiety among students, some studies evaluated other solutions to control and reduce this notion. In this regard, Tabatabaei conducted a research on psychology students of Islamic Azad University, Birjand Branch, to evaluate the effect of teaching self-regulatory learning strategies on academic progress and anxiety of the subjects. According to the results, comprehension and mastering of the mentioned strategies resulted in reduced anxiety level of students (19). In another study by Kim and Jung in a medical school in South Korea, a negative relationship was found between test anxiety and self-learning strategies, meaning that increased application of self-regulatory learning strategies by students reduced their test anxiety (20). In the current study, use of formative evaluation was identified as a proper solution to control the test anxiety of students.

Therefore, given the effect of test anxiety on

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academic dropout of students (7, 9), it is recommended that formative evaluations be performed by university instructors to both improve the participation of learners in their own learning process and prevent the negative effects of test anxiety on the performance of students in final exam. In addition, it is suggested that formative evaluation be properly included in the operative programs and policies by decision-makers and other managers of schools. In addition, it is recommended that appropriate facilities be provided so that organized and structured implementation of this type of evaluation could be carried out. Furthermore, academic counseling centers can use the results of the current research to their benefit.

Given the fact that the current study only assessed the function and role of formative evaluation in test anxiety, it is suggested that further studies be conducted on relevant factors of test anxiety in students, including the type of exam or number of formative evaluations. In addition, it is suggested that a separate research be carried out to evaluate the relationship between learning styles and test anxiety of students.

## Conclusion

According to the results of the current study, implementation of formative evaluation significantly reduced test anxiety level of students. In this regard, our findings and other results obtained by domestic and foreign studies demonstrated a high level of test anxiety among students. On the other hand, long-term experiences and observations of the researchers have indicated that little attention has been paid to the use of formative evaluation in educational processes. Therefore, it is essential to apply various strategies to emphasize formative assessment by instructors, which motivates and improves the self-regulatory learning skills of students, increases their participation in learning processes and prevents unfavorable effects of test anxiety on actual performance of students in final exams.

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