

*Original Article***Comparison the effect of two clinical teaching models on performance
of nursing students in intensive care unit**

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Abstract

Background: An important question of nursing trainers regarding clinical education is "why some students, in spite of good clinical education, are not able to perform nursing skills in suitable level?" An educational method to solve this problem is mastery learning. The aim of present study was to compare the effect of mastery learning and composed clinical teaching method on performance of nursing students in intensive care unit.

Methods: In a quasi-experimental study with pretest-posttest design, fifty-one last-year nursing students participated and divided into experimental and control groups. After pretest, control groups educated with composed clinical teaching method and the experimental groups educated with mastery learning method for 9 clinical days. For assessment the performance of nursing students in selected clinical procedures four checklists was prepared. For statistic analysis Mann-Whitney and Wilcoxon tests was used via SPSS software.

Results: In comparison the pretest-posttest differences of two groups, the average score of experimental groups in all procedures was further than control groups ($p = 0.001$). Also, in the end of clinical education many of experimental students reached to mastery level, but, few students in control groups reached to mastery level.

Conclusion: Due to significant effect of mastery learning method on clinical performance of nursing students, we suggest that nursing trainers use this method as a basic clinical teaching method especially to educate fundamental nursing skills.

Key words: Nursing education, clinical education, mastery learning, clinical performance

IJNMR 2008; 13(2): 81-86

In recent years, nursing education focused on theoretical education and deep gap between theoretical and clinical education created.¹ Many nursing researchers reported that nursing students, in spite of good knowledge base, weren't skillful in clinical settings.^{2,3} In result, with entrance of these unskillful students to the nursing care system, the quality of this system falls day to day.^{4,5}

Today, many of medical science trainers search for suitable educational methods to edu-

cate high level of clinical skills for their students.^{6,7} The best way for reaching this goal is using an educational method that activates learners and gives them suitable feedback about their learning.^{8,9} An educational method that can help trainers in reaching this goal is mastery learning.^{10,11}

Mastery learning was originated in viewpoints of John Carroll. Carroll (1963) believed that an important factor to distinguish between learners is the time they need for learning edu-

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Research Article of Tabriz University of Medical Sciences, NO. 85810.

cational goals; he believed that if enough time gave to learners, all of them can learn educational goals in a good level. Based on this viewpoint, Benjamin Bloom innovate mastery learning method. Bloom (1973) believed that this method engage learners in a process that mastery level established in them via frequent assessments (formative and summative), feedback and reparation education. The aim of formative assessments is to provide feedback for learners and determine the educational goals that need reparation education and the aim of summative assessment is to determine the final mastery level in learners.¹²

It should be considered that this educational method, like any other methods, has some faults. This method is time consuming and further help to weak students; in this method instructor focuses on these students. Another fault is that this method makes anxiety in learners because of frequent assessments.^{12,13} In spite of these faults mastery learning method has an important benefit; learners educated with this method, in the time of graduation, are skillful and have necessary skills for perform their professional responsibilities.¹²

Researchers conducted on effect of mastery learning method showed that it is effective in enhancing skills and knowledge of students in many disciplines;^{14,15} for example, Kazu et al in their research concluded that mastery learning was effective in teaching "usage of basic information technologies" course for university students.¹⁶ In another research, Mann et al stated that mastery learning approach were effective in educate osteopathic manipulative treatment for medical students.¹⁷ Wayne et al in their recent research reported that this method was effective in enhance cardio-pulmonary resuscitation skills in internal residents,¹⁸ But, in wide search of nursing literature few studies was found regarding the effects of mastery learning on clinical learning of nursing students; for example, Decker reported that mastery learning was effective in nursing education.¹⁹

Unfortunately, we couldn't find any recent research investigated the effects of mastery learning on clinical learning of nursing students

with experimental design. After extensive search of literature, we couldn't find any Iranian research that use mastery learning in clinical education of nursing students and we found only one research about the effect of this method on theoretical learning of midwifery students.²⁰ So, with regard of many problems showed in clinical performance of nursing students²¹⁻²³ and absence of any studies investigated the effect of mastery learning on clinical learning of nursing students in Iran, we decided to examine the effect of mastery learning on clinical learning of nursing students and compare it with composed clinical method. The aim of present study was to examine this hypothesis "clinical education with mastery learning is more effective on clinical performance of nursing students in intensive care unit, than composed clinical teaching method".

Methods

This study was quasi-experimental with pretest-posttest design. The study population was all last-year nursing students in faculty of nursing and midwifery, Tabriz University of Medical Sciences (N = 51) in the 2006-2007 educational year. In present study all of these students were selected with census sampling method. Inclusions criteria for students were selecting intensive care clinical course in the 2006-2007 educational year and be consent to participate in the study. In each semesters, students divided into 4 to 5 clinical groups and researchers, with simple randomize sampling, assigned this groups as control (26 students) and experimental (25 students). After that, each group according to their educational plan went to clinical setting for 9 clinical days. The brain intensive care unit of Imam Reza hospital selected for conduct this study. This hospital is a specialized center related to Tabriz University of Medical Sciences.

For assessment of nursing students' clinical performance in selected procedures (suctioning the airway, inserting naso-gastric tube, rapid neurological examination, and taking arterial blood sample), four checklists were prepared. The validity of these checklists was determined

by content validity and the reliability of them determined by inter-rater reliability. The agreement coefficient for checklists was 92%. Each checklist has three items including "don't applicable", "doing true", and "don't doing true or don't doing".

In the first day of clinical training, pretest conducted for control and experimental groups. Thus, clinical education of two groups was performed by different educational methods. Related to control groups, clinical education performed with composed method including performing independent or under supervision care of patients, independent or under supervision doing of clinical procedures, case report, and observation the performance of trainer or skillful nurses. Finally, in the end of training, posttest gained from all students. Related to experimental groups, after obtaining pretest in the first day of training, these checklists was analyzed by one researcher and the problems of each student determined in clinical procedures and two copies of it was given to student and clinical trainer. From next day of training until midcourse assessment, the trainer based on the results of this assessment determined specific educational goals for each student. In this program trainer was used any clinical teaching methods including performing independent or under supervision care of patients, case report, independent or under supervision doing of clinical procedures, and observation the performance of trainer or skillful nurses. After midcourse assessment (formative assessment), trainer changed students' educational plan according to the results of this assessment and continue to educate students according to new educational plan. Finally, at the end of training,

posttest was gained from all students (summative assessment).

For analyzing the data, SPSS software was used. In each checklist "don't applicable" items deleted and score 1 gave to "doing true" items and score zero gave to "don't doing true or don't doing" items; then final score of each student in clinical procedures was calculated. As study data did not respect normal distribution model, nonparametric tests were used. To compare the pretest and posttest within groups the Wilcoxon test and for compare pretest and posttest between groups the Mann-Whitney test were used. Also, to compare some demographic characteristics between groups including age and educational averages independent t-test were used.

Results

Fifty one nursing students in control (N = 26) and experimental (N = 25) groups participated in this study. Regarding sex distribution, 60.4 percent of students were female and 39.7 percent were male. In further analysis with independent t-test, no significant difference found between control and experimental students in age ($p = 0.89$), average of diploma ($p = 0.35$) and average of pervious university semesters ($p = 0.23$).

Performance pretests of control and experimental group students compared via Mann-Whitney test. As showed in table 1, there was no statistical difference between pretests of control and experimental groups and it mean that at the beginning of the study, control and experimental students were same in selected clinical procedures.

Table 1. Comparing the pretest scores of control and experimental groups.

Procedures	Groups	Control (N = 26)	Experimental (N = 26)	Z**	P**
		Mean \pm SD	Mean \pm SD		
Taking arterial blood gas sample		10.15 \pm 3.30	8.84 \pm 1.86	- 0.85	0.39
Suctioning the airway		7.88 \pm 2.70	7.80 \pm 2.94	- 0.15	0.87
Rapid neurological examination		7.61 \pm 0.85	8.00 \pm 2.69	- 0.51	0.60
Inserting naso-gastric tube		10.26 \pm 2.03	9.96 \pm 1.61	- 0.21	0.83

* Reported means are arithmetical
** Results of Mann-Whitney test reported

Table 2. Comparing of pretest and posttest scores of control and experimental groups.

Procedures	Control (N = 26)		Z**	P**	Experimental (N = 26)		Z**	P**
	Pretest Mean \pm SD	Posttest Mean \pm SD			Pretest Mean* \pm SD	Posttest Mean* \pm SD		
Taking arterial blood gas sample	10.15 \pm 3.30	18.00 \pm 3.17	- 4.46	0.001	8.84 \pm 1.86	24.84 \pm 1.92	- 4.46	0.001
Suctioning the airway	7.88 \pm 2.70	19.30 \pm 2.73	- 4.46	0.001	7.80 \pm 2.94	25.12 \pm 1.05	- 4.46	0.001
Rapid neurological examination	7.61 \pm 0.85	16.76 \pm 2.76	- 4.47	0.001	8.00 \pm 2.69	23.24 \pm 0.86	- 4.47	0.001
Inserting naso-gastric tube	10.26 \pm 2.03	17.69 \pm 1.61	- 4.51	0.001	9.96 \pm 1.61	20.88 \pm 0.33	- 4.51	0.001

* Reported means are arithmetical
 ** Results of Wilcoxon test reported

To analyze the effect of two selected clinical teaching methods on clinical performance of control and experimental students Wilcoxon test was used (table 2). Results showed that both methods enhance the performance of students in selected procedures. It means that both of mastery learning and composed method were effective methods and enhanced the clinical performance of nursing students in clinical settings.

For testing research hypothesis, regarding further effect of mastery learning on clinical performance of nursing students, the mean differences of pretests and posttests of control and experimental groups was calculated in four selected procedures. Then, for assessing the meaningfulness of these differences, Mann-Whitney test was used. This test showed that in all procedures students educated with mastery learning gain better scores than students educated with composed method (table 3).

For assessing that in the end of educational course how many percent of control and experimental students reached to mastery level, this level based on Anderson and Block viewpoints determined at 87.5 percent.¹² Results showed that regarding experimental groups, 20 students (80%) in taking arterial blood gas sample procedures, 24 students (96%) in suctioning the airway procedures, 25 students (100%) in inserting naso-gastric tube procedures, and 16 students (64%) in rapid neurological assessment procedures reached to mastery level at the end of 9 days clinical experience. Regarding control groups, results showed that at the end of education 1 students (3.8%) in taking arterial blood gas sample procedures, 5 students (19.2%) in suctioning the airway procedures, 8 students (30.8%) in inserting naso-gastric tube procedures and no student (0%) in rapid neurological assessment procedures reached to mastery level.

Table 3. Comparing of mean differences of pretest and posttest scores of control and experimental groups.

Procedures	Groups		Z**	P**
	Control (N = 26) Mean \pm SD	Experimental (N = 26) Mean \pm SD		
Taking arterial blood gas sample	7.84 \pm 2.89	16.00 \pm 2.44	- 5.85	0.001
Suctioning the airway	11.42 \pm 3.11	17.32 \pm 3.35	- 4.77	0.001
Rapid neurological examination	9.15 \pm 3.01	15.44 \pm 2.53	- 5.21	0.001
Inserting naso-gastric tube	7.42 \pm 2.19	10.92 \pm 1.60	- 5.34	0.001

* Reported mean are arithmetical
 ** Results of Mann-Whitney test reported

Discussion

The present study showed that clinical education of nursing students in brain intensive care unit with mastery learning method was more effective than composed clinical teaching method.

It should be noted that in extensive search of Iranian literature, we found only one research investigated the effect of mastery learning on learning of medical science students. In that study, Ebrahimi et al compared the effect of mastery learning and lecturing method on theoretical learning of midwifery students and concluded that at the end of education, most of mastery learning students reached to mastery level and gain better scores than lecturing students.²⁰ In nursing education we have many problems in the context of clinical education because it is more complex than class education and clinical trainers have less control on learning process of students. In literature review, any article investigated the effect of mastery learning method on clinical learning of Iranian nursing students was not found. In a recent study conducted in Unites State, Wayne et al in their experimental study investigated the effect of mastery learning on internal residents' cardio-pulmonary resuscitation skills. Finally, researchers concluded that at the end of the study, all residents reached to mastery level.¹⁸ these results are same as the results of present study; because we found that at the end of study, many of mastery learning students reached to mastery level compare with composed learning method students. Therefore, regarding the further effect of mastery learning method on clinical performance of nursing students in brain intensive care unit, the study hypothesis was approved.

As mentioned before, some problems are reported in using mastery learning as a teaching method. One of these problems was time consuming. But, Arlin stated that if mastery learning used in flexible manner, it does not need extra time than traditional teaching methods.²⁴ In present study, the duration of clinical education was same for experimental and control students, but at the end of the study, experimental students gained better scores than controls. Therefore, results showed that in clinical

education, mastery learning did not need further time compared with composed method. We think that perhaps this problem exists only in theoretical education, where in each class 25 to 35 students educate in same time and teachers have narrow time to work with each student. But, in clinical education, students reach to mastery level, have extra time to practice until weak students reach to the level and maybe in this period, these students reach to skill level that is a better level of performance than mastery level. In other hand, in clinical education fewer students educate in clinical groups (4 to 5 students) and trainer has further time to work with each students. In spite of problems reported for mastery learning, nursing is a profession and Iranian health system needs nurses have fundamental skills of caring in good level. Therefore, the mastery learning system provide nursing students with suitable basic skills and prevent strengthens of some students and weakness of other students, that occur in our education system.

Finally, due to positive effects of mastery learning on clinical learning of nursing students, we suggest that nursing trainers use this method as a one of their clinical teaching methods; especially, in teaching fundamental procedures; because nursing students should learn these procedures in good level to performing their professional responsibilities.

This research had some limitations that frequently happen in experimental educational researches. First, in spite of this fact that all of our final-year nursing students participated in this research (51 nursing students), but this sample size is low. Second, in this research one of the researchers educated all of control and experimental students and all of clinical assessments performed by this researcher and this participation maybe affect the results. Therefore, we advise that other studies conduct on efficacy of mastery learning on clinical learning of nursing students with better sample size and if possible the education of groups be done by a trainer that don't participated in the study. Also, the authors declare that have no conflict of interest in this study and they have surveyed under the research ethics.

Acknowledgment

This article is result of a research project funded by research deputy of Tabriz University of Medical Sciences and researchers

acknowledge of dear nursing students participated in this study.

References

1. Porzareh NM. Assessing the factors affected on theoretical and clinical education in nursing in viewpoint of trainers and final year nursing students of Tabriz faculty of nursing and midwifery. [MSc Thesis]. Tabriz: Tabriz University of Medical Sciences. 1994.
2. Ward RP, Saylor C. Nursing school curricula and hospital-based training programs. *AORN J* 2002; 76(6): 1022-31.
3. Jaffari Golestan N, Vanaki Z, Memarian R. Organizing "Nursing Mentors Committee": an Effective Strategy for Improving Novice Nurses' Clinical Competency. *Iranian Journal of Medical Education* 2008; 7(2): 237-46.
4. Tucker K, Wakefield A, Boggis C, Lawson M, Roberts T, Gooch J. Learning together: clinical skills teaching for medical and nursing students. *Med Educ* 2003; 37(7): 630-7.
5. Kramer M. Reality shock: Why nurses leave nursing. 1st ed. St Louis: Mosby; 1974.
6. Issenberg SB, McGaghie WC. Clinical skills training--practice makes perfect. *Med Educ* 2002; 36(3): 210-1.
7. Amini A, Hassanzadeh Salmasi S, Shaghghi A, Safaii N, Sedaghat K. The Effect of Clinical Skills Training on Medical Students Clinical Competencies in the Management of Vaginal Delivery. *Iranian Journal of Medical Education* 2005; 5(1): 7-12.
8. Rao SP, DiCarlo SE. Active learning of respiratory physiology improves performance on respiratory physiology examinations. *Adv Physiol Educ* 2001; 25(1-4): 127-33.
9. Hoke MM, Robbins LK. The impact of active learning on nursing students' clinical success. *J Holist Nurs* 2005; 23(3): 348-55.
10. Seif AA. Educational psychology. 5th ed. Tehran: Agah Publication; 2000. [In Persian].
11. Joyce B, Weil M, Calhoun E. Models of teaching. 6th ed. New Jersey: Pearson Education; 2000.
12. Folger El. Efficacy of mastery learning as a method of instruction: implications for instructional leaders. [PhD thesis]. Washington: Ashland University; 2005.
13. Gentile JR. Assessing fundamentals in every course through mastery learning. *New Directions for Teaching and Learning* 2004; 100: 15-20.
14. Bjørk IT. Practical skill development in new nurses. *Nursing Inquiry* 1999; 6 (1): 34-47.
15. Crijnen AAM, Feehan M, Hellam SG. The course and malleability of reading achievement in elementary school: The application of growth curve modeling in the evaluation of a mastery learning intervention. *Learning and Individual Differences* 1998; 10(2): 137-57.
16. Kazu IY, Kazu H, Ozdemir O. The effects of mastery learning model on the success of the students who attended "Usage of basic information technologies course". *Educational Technology and Society* 2005; 8(4): 233-43.
17. Mann DD, Eland DC, Patriquin DA, Johnson DF. Increasing osteopathic manipulative treatment skills and confidence through mastery learning. *J Am Osteopath Assoc* 2000; 100(5):301-4, 309.
18. Wayne DB, Butter J, Siddall VJ, Fudala MJ, Wade LD, Feinglass J, et al. Mastery learning of advanced cardiac life support skills by internal medicine residents using simulation technology and deliberate practice. *J Gen Intern Med* 2006; 21(3): 251-6.
19. Decker B. Implementation of the mastery learning/modular curriculum in nurse-midwifery education. *J Nurse Midwifery* 1990; 35(1):3-9.
20. Ebrahimi N, Saif AA, Sahnazarian J. Comparison the efficacy of education by mastery learning with traditional education methods. *Behbood* 1994; 1(1): 4-13. [In Persian].
21. Poorman SG, Webb CA, Mastorovich ML. Students' stories: how faculty helps and hinders students at risk. *Nurse Educ* 2002; 27(3): 126-31.
22. Zazari R, Beheshti Z, Haji Hossieni F, Saat Saz S, Arzani A, Bijani A. Stressor factor in clinical education of Amol nursing & midwifery faculty. *Journal of Babol University of Medical Sciences* 2006; 9(2): 45-50.
23. Rahmani A. The effects of concept mapping on theoretical learning of nursing students in "nursing process" course. [MSc Thesis]. Tabriz: Tabriz University of Medical Sciences; 2005.
24. Arlin M. Time, equality, and mastery learning. *Review of Educational Research* 1984; 54 (1): 65-86.