

## The effects of two educational methods, classic and critical thinking strategies (CTS), on the stable learning of nursing students

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### ABSTRACT

**Background:** In recent decades explosion of knowledge seriously challenged the conventional educational models based on the transmitted knowledge. Most people recognize the need for critical thinking skills in recent years.

**Purpose:** This study was performed to assess the effects of two educational methods, classic and critical thinking strategies (CTS), on the stable learning of nursing students.

**Methods:** The current experiment is a quasi-experimental study conducted to 17 nursery students of the 3<sup>rd</sup> semester of Semnan University of Medical Science. We divided gastrointestinal (GI) disease nursing course into two separate parts consisted of upper GI diseases and lower GI diseases. First part was educated with classic method and second part with CTS method. Final test of each part was performed independently one week after the end of each part. In order to assess the stable learning in students, post test of each part was done with an interval of 3 months (12 week) after the primary test without any preinforming. In order to assess the effects of CTS method on students' critical thinking skills, critical thinking skills levels of students was evaluated in the beginning and the end of semester with California critical thinking skills test (form B). Data were analyzed using SPSS statistical software.

**Results:** Correlation coefficients between scores obtained by the subjects under study in the primary and secondary exams in CTS- and classical-based courses were 0.856 and 0.787, respectively. There was a significant difference between levels of critical thinking skills before and after implementation of CTS based educational method ( $p=0.041$ ).

**Conclusions:** Both methods lead to stable learning in nursing students and there is no significant statistical difference between two methods. On the other hand, CTS-based method can increase students' critical thinking skills.

**Keywords:** CRITICAL THINKING, EDUCATION, CLASSIC EDUCATION, STABLE LEARNING, NURSING STUDENTS

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### Introduction

Jean Jacques Russo believes that packing the brains with theoretical information and facts is a wasting of resources, talents and time of the youth. He argues that instead of information transfer, one should make effort to expand and strengthen the conceptual abilities of the people (1).

Development and improvement of the students' intellectual skills was always a complex problem in education. This crisis has worsened in recent years, as the knowledge output has been far more advanced than the improvement of critical thinking skills, thus making a great concern among educational experts about the students' inability in critical thinking. The tendency of scientific circles to promote critical thinking skills is not new, and goes way back to Plato's academy (2). In recent decades explosion of knowledge seriously challenged the conventional educational models based on the transmitted knowledge (2).

These models may have been justified or at least understandable in an era of relative stability in which knowledge and technology enhanced very gradually and an era in which education was considered a right and privilege for essentially an elite leisured class. But these days, this definition for mission and purpose of education is no longer appropriate. Therefore the ultimate goals of education and training must change, because lecturing leads to the extension of passive learning and there will be little, if any, training in critical thinking skills (3).

Based on this need to critical thinking education, one of the defined national aims of education for 2000 in United States (fifth aim) is improving students' critical thinking abilities. Today critical thinking ability is considered as one of the skills that should be achieved during Baccalaureate Curriculum in U.S (4, 5).

American Association of the Colleges of Nursing and The National League for Nursing (NLN) includes the measurement of critical thinking as a

required outcome in the evaluation and accreditation of baccalaureate and higher degree programs in nursing from 1986 onward. This critical thinking outcome must reflect the student's skill in analysis, reasoning, research, or decision-making as these skills relate to the nursing discipline (6, 7).

Critical thinking is a cognitive process with which one can judge and make decisions based on reasoning and analysis of the available data (8). In other words, a critical thinker should judge the credibility of sources, identify conclusions, reasons, and assumptions, judge the quality of an argument, including the acceptability of its reasons, assumptions, and evidence, develop and defend a position on an issue, ask appropriate clarifying questions, plan experiments and judge experimental designs, and define terms in a way appropriate for the context. He/she should also be open-minded, try to be well informed and draw conclusions when warranted, but with caution (9, 10, 11).

It should be noted that educational institutes are not addressing their main objective, which is to transfer critical thinking skills. The bulk of educational subjects and graduates' inefficiency in real job environment have caused dissatisfaction among both instructors and students (12). However, critical thinking ability and skills cannot be improved with just listening to the lectures and reading educational references and without instructor's assistance. Critical thinking needs to be taught in a dialectical or dialogic way as arguments in relation to counterarguments. Teachers should promote discussion among students by using in-class group assignments and encourage out-of-class study groups (2, 13).

The instructors should clarify the objectives of critical thinking in the framework of each educational discipline and provide opportunities for training skills and critical thinking methods (2, 13). They should confront the students with various problems and situations and force them to make mental efforts. The students should find themselves participating in educating/learning activities (1).

Bruner also believes that the learner should not be faced with mere facts, but with situations that will encourage him to discover the relations and find necessary data and solutions (8). Dewey suggests that if the learner collects and prepares data actively to extract conclusions and concepts, those concepts will be more meaningful and stable and will remain for a longer time (14).

Thus, it seems that with the massive bulk of available information and the incompetency of conventional educational systems to prepare the students for their profession, the educational institutes' role as data reservoir and the instructors' role as mere lecturers must be changed, and the students should improve their skills in reasoning, thinking and data processing and using (2).

Considering the importance of critical thinking education in a world of accelerating changes we decided to compare the effect of critical thinking strategies (CTS) on stable learning with that of conventional (classic) education models based on lecture and transmitted knowledge.

## Materials and Methods

The current experiment is a quasi-experimental study conducted to 17 nursery students of Semnan University of Medical Science who educated in the 3<sup>rd</sup> semester in 2001-2002 educational year. Their mean age was  $20.46 \pm 1.02$  and most of them (15 students) were female.

We divided gastrointestinal (GI) disease nursing course into two separate parts consisted of upper GI diseases and lower GI diseases.

Students pass the upper GI diseases course during the first 8 weeks of the semester through participating in eight 2-hour sessions and were trained by classic educational method.

In the second 8 weeks of the semester they participated in eight 2-hour sessions to pass the lower GI diseases course and in this period, they were trained by a CTS based educational method.

The exam of each course was taken after finishing that course (primary exam).

Classic method implied in the first half of the semester was composed of multimedia-aided lectures followed by answering the students' questions on what had been taught by the lecturer. CTS based education implied in the second half of the semester was composed of in-class writing assignments and some homework, group discussion, short-time workshops, interactive lectures, and students' lectures and conferences about what was taught in the class.

Each CTS based educational session was scheduled as follows:

1-Presentation of homework related to the pervious session by 2 or 3 students and group discussion on presented topics (10-12 minutes).

2- Asking some questions related to the contents of the new subject in order to motivate students to

pay more attention to following lecture (2-3 minutes).

3- Lecturing (multimedia-aided, interactive, instantiating by presenting objective examples related to what has to be taught, considering time limits for each part by lecturer, giving an outline of what was taught at the end of lecture) (40-45 minutes).

4- After answering students' questions, they discussed through in-group assignments by holding two small workshops (9 students in one workshop and 8 students in another). The discussions were mainly based on a case report. Then the representative of each group presented what was concluded in his/her own group and discussed the group's answers to the questions provided in in-class writing assignments (40-45 minutes).

5- At the end, one of the students gave an outline of what was taught in the class and distributed homework question sheets.

Lecturers had to assess the students' homework closely and give appropriate feedbacks to encourage critical thinking in students. They also had to be ready to meet the students and answer their questions for at least 4 hours per week.

3 months after finishing the semester, another exam was taken for each course without any preinforming (secondary exam), in order to assess the persistency of knowledge that students achieved during the courses (stable learning).

At the beginning and the end of the semester, California critical thinking skills test (CCTST) (form B) was also conducted to the subjects of the study to evaluate the level of critical thinking skills.

Each exam had 8 scores and also 2 scores for in-class assignments was considered, thus each course had 10 scores in total and finally the overall score for 2-credit GI diseases course was 20.

Exams were based on the contents of what was taught in each course and contained some multiple-choice and short-answer questions. Related educational objectives and standards were considered in planning and designing the exams.

The exams taken after 3 months also had the same characteristics.

CCTST (form B) was consisted of 34 multiple-choice questions in 5 fields (analysis, evaluation, perception, inductive reasoning and deductive reasoning). Respondents obtained one score by answering each question correctly. Thus the overall maximum score of this test was 34.

Respondents had to fill out this questionnaire in 45 minutes at the latest.

Reliability and validity of CCTST had been assessed and well established by the authors. Reliability was 0.62 based on Richardson equation 20, and construct validity showed a positive relation between all five elements and total test score. The test was also able to highlight the difference between philosophy and nursery students in terms of level of critical thinking skills ( $t = -4.95$ ,  $p = 0.0001$ ) (15).

Statistic analysis was done using SPSS software. Correlation between scores obtained by the study group in the primary and secondary exams were assessed and correlation coefficients of more than 0.6 were considered as an indicator of appropriate persistency of the knowledge achieved by the subjects during the educational course (stable learning).

Results showed that in both groups, this correlation coefficient was greater than 0.6, therefore "differences between scores obtained by the subjects in primary and secondary exams in CTS based course" was compared with "differences between scores obtained by the subjects in primary and secondary exams in classic course" by implying paired T test.

Paired T test was also implied to compare levels of critical thinking skills before and after implementation of CTS based educational method.

## Results

Mean scores for the primary and secondary exams in CTS-based course were 14.34 and 12.26, respectively; while mean scores for the primary and secondary exams related to the first course (first 8 weeks of the semester) that education was based on a classic method was 12.66 and 9.99, respectively. Maximum score was 16 (Table 1).

Correlation between scores obtained by the study group in the primary and secondary exams were assessed and correlation coefficients for CTS-based educational course and the classic method were 0.856 and 0.787, respectively (Table 2).

Comparing "differences between scores obtained by the subjects in primary and secondary exams in CTS based course" and the same variable in classic course using paired T-test, showed no statistically significant difference ( $p > 0.05$ ). But there was a significant difference between levels of critical thinking skills before and after implementation of CTS based educational method

**Table 1.** Mean scores of nursing students (with the maximum score of 16)

Indicator	Mean		SD		p-Value
	Primary Exam	Secondary Exam	Primary Exam	Secondary Exam	
Classic Method	12.66	9.99	1.80	1.88	0.000
CTS-based	14.34	12.26	1.86	2.51	0.0001

**Table 2.** Percentage correlation between mean scores of primary and secondary exams in each educational course

Correlation	Educ. Course	Classic		CTS-based	
		Primary Exam	Secondary Exam	Primary Exam	Secondary Exam
Mean Score		12.66	9.99	14.34	12.26
Percentage		100	78.8	100	85.56

**Table 3.** Mean scores of CCTST at the beginning and the end of the semester in CTS based educational method

Indicators	Mean Value	SD	p-Value
<b>Time</b>			
Beginning of Semester	10.12	3.59	0.041
End of Semester	11.53	3.62	

( $p=0.041$ ) (table 3). The scores were 10.12 and 11.53, respectively.

## Discussion

Critical thinking is a cognitive activity and systematic mental effort to understand and examine the findings and phenomena and their relations, based on reasoning and analysis skills (16). Watson and Glaser viewed critical thinking as a "composite of attitudes, knowledge, and skills which includes: (1) attitudes of inquiry that involve an ability to recognize the existence of problems and an acceptance of the general need for evidence in support of what is asserted to be true; (2) knowledge of the nature of valid inferences, abstractions, and generalizations in which the weight or accuracy of different kinds of evidence are logically determined; and (3) skills in employing and applying the above attitudes and knowledge".

The Watson-Glaser Critical Thinking Appraisal (WGCTA) is an assessment tool designed to measure an individual's critical thinking skills. The examinee is asked to evaluate reading passages that include problems, statements, arguments, and interpretations (17).

Various definitions and perspectives of critical thinking have been proposed. In 1989-90, however, Facion and Facion, in their analysis of the concept of critical thinking -with cooperation of a number of US universities and American Philosophical Association, through its Committee on Pre-College Philosophy- conducted a Delphi study among 46 experts, and found remarkable consensus on the descriptions of each of the skills and sub-skills in critical thinking. They concluded that "critical thinking is a non-linear, recursive process in which a person forms a judgment about what to believe or what to do in a given context", and developed CCTST on the basis of this finding (7, 9, 10, 18).

Main cognitive skills of critical thinking have a great role in achieving this judgment. These skills include interpretation, analysis, evaluation, inference, explanation, and self-regulation. These skills were categorized as inductive and deductive reasoning previously (18).

Development and improvement of critical thinking skills in higher education requires specific strategies in the process of education. Five methods have been discussed for improving these skills: Observation of students in practice; Questions for critical thinking, including Socratic questioning; conferences; problem solving strategies; and written assignments (19-21). Jones believes that in critical thinking strategies, information is collected from different resources and with various methods; therefore, theoretical education is combined with practical thinking and this can make students more motivated to use their critical thinking skills (22).

In the current study, CTS based education resulted in obtaining higher scores by the students in comparison with their scores in a course based on a classic educational method; although there was no significant statistical difference between these two methods in the persistency of knowledge that the students achieved during the course.

Moreover, implementation of CTS-based method resulted in more persistency of the achieved knowledge among students (stable learning) as they could remember over 85% of what they learned throughout a CTS-based educational program after 3 months, which was much more than the classic method.

Critical thinking programs may seem unsuccessful because of some limitations. Our students are familiar with classic educational method because it has been the predominant and formal method of our educational system for a long time. Implementation of CTS as well as any other new method needs to be formed through practicing and repetition in educational settings. This is especially true in the case of CTS, as the student needs to achieve the required skills with great effort throughout his entire educational life.

Another point to be mentioned here is that the sample size of the study plays an important role in producing statistically significant findings; our sample size was relatively small so it may explain the insignificant results.

However, results of the study demonstrated that passing a CTS-based educational course improves the level of critical thinking skills among the students in just one semester. Some authors have mentioned that these skills cannot be improved

with passing only one semester in a classic educational system, and for statistically significant improvement, the students have to pass at least two semesters in a curriculum with a classic educational method (2, 3, 18, 23-26).

It should also be mentioned that the mean score of CCTST among current study group (11.53) was lower than the total average score of baccalaureate nursing students in Semnan Nursing and Paramedical School (12.34), but it was comparable with the average score of nursing students in Tehran Medical University (11.68) (27).

According to the results, using multimedia-aided teaching, allowing students to ask their questions, and planning an appropriate problem solving strategy by the lecturer can improve consistency of knowledge among students in a classic educational method.

Nurse educators should be charged with designing and evaluating programs to achieve the necessary knowledge, skills, and competencies that foster critical thinking for appropriate decision-making and more effective clinical judgment among nursery students.

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