

## The Effect of Teaching Methods on Changes of Respiratory Therapy Students' Critical Thinking

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**Abstract:** Assessing critical thinking of the respiratory care students is very important in order to improve the critical thinking and decision making skills. The main aim of this study was to examine the effect of teaching methods on respiratory therapy students' critical thinking ability. Method: The researcher used short-form Watson Glaser critical thinking appraisal instrument to measure the critical thinking ability of 44 students of respiratory care students from King Saud Bin-Abdul-Aziz University for Health Sciences (KSAU). All students of batch I (Graduate), batch II (Interns), batch III (senior students) and batch IV (junior students) were included. Comparison between the batches using ANOVA test was done. Results revealed that the mean score of the whole batches is 53% which considered as average critical thinkers. There was no significant difference between the batches in the critical thinking (P-Value=0.59). There was no significant difference between the group which have more clinical exposure and the group with less clinical exposure (P-Value=0.27). Conclusion: It is concluded from the result that insignificant result might be related to the instrument used and/or the respiratory care program that needs to add more innovative strategies focusing on critical thinking for teaching and learning of the students. It is recommended that further research to other respiratory care curriculum locally and/or internationally to compare their critical thinking ability with present study results and using different instruments to determine critical thinking ability.

**Key words:** Critical Thinking • Respiratory Care • Decision Making • Skills • Medical Education

### INTRODUCTION

Globally, medical educators give more emphasis on teaching and assessing critical thinking ability for their students. According to American Psychology Association, critical thinking can be defined as the "process of evaluating propositions or hypotheses and making judgments about them on the basis of well supported evidence" [1]. In respiratory care therapy thinking critically enforces information on which good decisions can be taken. For this, a respiratory care student must know the important facts that are required to determine the best life-saving interventions. Therefore, respiratory care graduates must be able to recall the essential information during an emergency in order to think critically.

One of the important characteristics of the respiratory therapist who's working in critical care is to think critically in situations when it's necessarily needed. There are many situations required from a respiratory therapist to use their critical thinking ability during their regular work. These situations include: patient care; sharing information regarding management of specific disease on mechanical ventilation and participate in decision making [2]. Other benefits of the respiratory therapists' critical thinking include technological problems such as: troubleshooting the respiratory care equipment's, recommending the appropriate machine to be used for a certain type of disease or anything related to technical issues. Moreover, research evidence showed that there is strong correlation between the students who had higher critical thinking score and made better decision

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making in clinical scenarios [3, 4]. Accordingly, medical and allied health sciences programs are focusing on improving the critical thinking of their students, yet there is uncertainty about teaching method of critical thinking [5]. One of suggested teaching methods which may enhance students' critical thinking and increase their satisfaction about their programs include PBL curriculum [6]. The curriculum of the respiratory care program at King Saud bin Abdul-Aziz University for Health Sciences (KSAU-HS) is built on Problem Based Learning (PBL) along with other teaching strategies. The adoption of critical-thinking-based approaches represents a difficult shift for both faculty and students. Students experience a great deal of tension when they transition from a passive approach of learning to problem-based learning[7], which is vital to developing critical-thinking skills. Accordingly, critical thinking is an important characteristic which needs to be developed in respiratory care students. However, there are lack of published evidence globally and in Saudi Arabia about factors influence students critical thinking ability. Thus, the aim of this study was to examine the effect of teaching methods on respiratory therapy students' critical thinking ability.

## MATERIALS AND METHODS

A cross-sectional design was used in this study. The study protocol received ethical approval from the Research Council of the King Saud Bin Abdulaziz University-medical School (Saudi Arabia) before the study was conducted. Informed consent was taken from the department and the students and confidentiality statement for each participant was given. The study took place at College of Applied Medical Sciences in King Saud bin Abdul-Aziz University for Health Sciences (KSAU-HS), Riyadh, Saudi Arabia. The study included all participants (graduate, interns, senior and junior students) of the respiratory therapy program who were graduated and those currently studying at KSAU-HS. There were four batches of male respiratory therapy students (Batch1= 14 students, Batch2= 15 students, Batch3= 15 students and batch 4= 13 students for a total of 57 students) who graduated from high school and currently studying the bachelor degree in respiratory therapy.

The Watson Glaser Critical Thinking Appraisal (WGCTA) was used to measure respiratory therapy students' critical thinking ability [8]. The WGCTA is one of the most widely measurement test used in critical thinking research. In this study the short form of the

WGCTA-S was used. This instrument validity and reliability have been ascertained in various critical thinking studies [9]. The questionnaire distributed to the students in the class on their free time and online version was sent to graduate students. The questionnaire is self-administered and took about 40-45 minutes to complete it. The WGCTA is divided into five subtests: Test one: Inference, which is discriminating among degrees of true and false facts of a given piece of data or information. Test two: Recognition of Assumptions, which is recognizing stated and unstated assumptions in any given statement. Test three: Deduction, which refers to the ability to determine if a given conclusion follows the given information. Test four: Interpretation, the ability to examine the pros and cons of an argument and determine if the conclusions are justified. Test five: Evaluation of Arguments, the ability to distinguish strengths and weaknesses of an argument on a particular problem.

**Statistical Analysis:** Data analysis was computed with the Statistical Package for Social Sciences (SPSS). Descriptive analysis is presented as frequencies and percentages for categorical variables and as mean and standard deviation ( $\pm$  SD) for numerical variables (e.g. age, years). ANOVA was used to compare the difference between the batches and t-test was done to compare the subtest scores of critical thinking of more clinical exposure students and less clinical exposure students. A p-value of  $<0.05$  is considered as statistically significant for all the statistical tests.

## RESULTS

The number of students included in the study was 44 and they are distributed into four groups: batch 1 (graduate), batch 2 (interns), batch 3 (senior students) and batch4 (junior students). The responses rate to the questionnaire was good, 44 out of 57 (77%). Among them Batch one response rate is 9 out of 15 (60%), Batch two is 11 out of 14 (78%), batch three is 13 out of 15 (87%) and batch four is 11 out of 13 (85%). The average age of the respondents is  $21.6 \pm 1.3$  years and the age ranges between 19 to 25 years. For more details about students demographic characteristics please see (table 1).

The frequency of scores on WGCTA-S is shown in figure 1. The mean score of the students is  $21.4 \pm 3.99$ . Most of the students are at the average level of critical thinking.

Table 1: Demographic of Students different levels

| Batches | Level           | Average age | No. of students | Responses |
|---------|-----------------|-------------|-----------------|-----------|
| Batch 1 | Graduate        | 23.2 ± 0.8  | 15              | 9         |
| Batch 2 | Interns         | 22.1 ± 0.5  | 14              | 11        |
| Batch 3 | Senior students | 21.3 ± 0.6  | 15              | 13        |
| Batch 4 | Junior students | 20.1 ± 0.7  | 13              | 11        |

Table 5: the Comparison of Two Groups on Subtest of Critical Thinking

| Subtest                   | Graduates / Interns (n=20) Mean ± sd | Senior / Junior Students (n=24) Mean ± sd | p-value |
|---------------------------|--------------------------------------|---|---------|
| Inference                 | 2.3 ± 1.2                            | 2.5 ± 1.4                                 | 0.53    |
| Recognition of assumption | 5.1 ± 1.5                            | 5.6 ± 1.2                                 | 0.20    |
| Deduction                 | 5.1 ± 1.3                            | 5.7 ± 1.9                                 | 0.22    |
| Interpretation            | 3.3 ± 1.3                            | 3.2 ± 1.8                                 | 0.93    |
| Evaluation of Arguments   | 5.1 ± 1.1                            | 5.1 ± 1.3                                 | 0.96    |

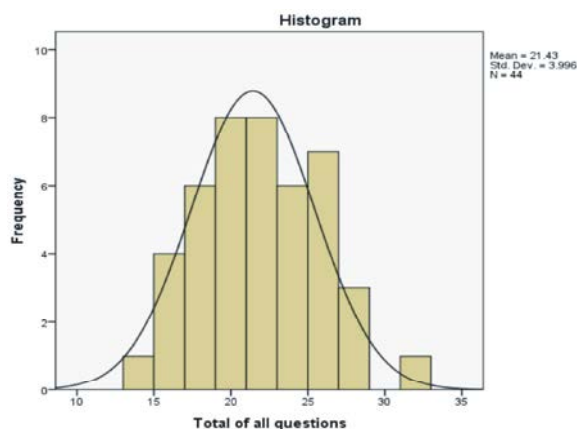


Fig 1: Frequency of Scores Obtained by respiratory therapy students

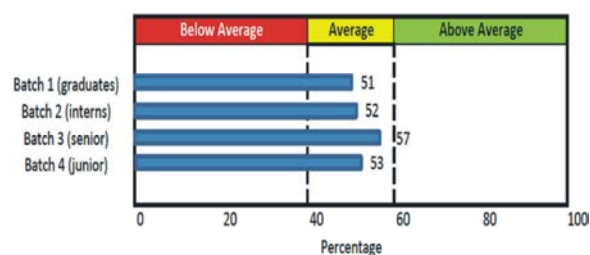


Fig 2: The Mean scores of each Batch

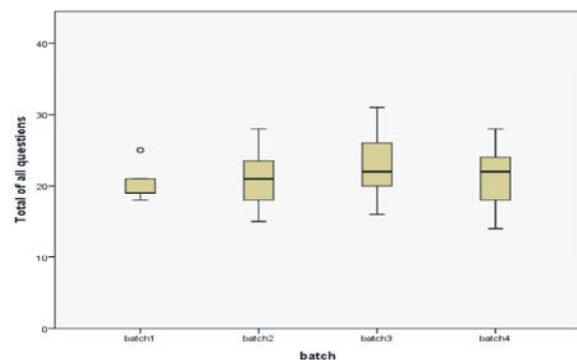


Fig 3: The Comparison between the Groups on Critical Thinking

The mean score of students on WGCTA-S was calculated. The mean critical thinking score for the whole batches was 21.4 ± 4 with minimum score of 14 and maximum score of 31. The critical thinking ability of the students was considered on the average (Fig. 2).

As showed in Figure 3. by using ANOVA test, we compared the scores between the groups. The result showed no significant difference between the batches on the critical thinking ability (P-Value 0.59).

As shown in table 5. There was no significant difference found in responses of both groups when the researcher compares the senior and junior students on different subtests of critical thinking, (Table 5).

## DISCUSSION

The results of this study showed that respiratory therapy students' critical thinking ability is average. This was below our expectation because the curriculum of respiratory therapy students who study at King Bin Abdul-Aziz University curriculum is based on problem based learning (PBL) teaching method. It has been suggested that students from PBL curriculum are expected to have better critical thinking and decision making skills [3, 6, 10-12]. Moreover, it was also expected that the graduate students might get higher score compared with the junior students. However, there was no significant difference of the critical thinking score between the batches. The possible explanation for our students' critical thinking ability average score may be due to respiratory therapy program curriculum design which may be not aligned with the new requirements of the curriculum that require critical thinking ability in respiratory care therapists. Due to lack of research studies related to critical thinking ability in respiratory therapy students our study results might be related to two main things: the questionnaire itself and/or the curriculum of

the respiratory care program. The version of the questionnaire was in English language and the student's English level is on the average. Some of the students claimed they might get higher score if the questionnaire was written in Arabic language and if the number of the questions were less. Although WGCTA-S is been used widely to determine the critical thinking, still it might not be the best way to determine critical thinking in respiratory therapy students. The other reason could be related to the respiratory therapy program curriculum design. It seems to be the curriculum didn't give more emphasis on assessing critical thinking of the students and how to improve it. Despite of these findings, the study showed that learning critical thinking in respiratory therapy at KSAU is not given much importance which in first author's opinion does not happen without the support of the curriculum managers, faculty members and the program administration. Critical thinking may develop in authentic learning environment where student must be ready and motivated to learn. We all know that students will be going to less motivated from unchallenging and unmotivated faculty. They always need the zone of proximal development where students can perform at a level of mastery. The students must spend time on observing and thinking on actual or symbolic models for the development and application of critical thinking ability. Students must be given challenges with the collaboration of other students and faculty in the development of critical thinking ability.

**Study Limitations:** Language limitation, since the questionnaire is written in English language and the student's English level is average. Also there was small sample; larger sample size may reveal different results and higher response rate to the questionnaire. The possible explanation for the questionnaires responses rate in this study may be due to several factors such as: difficulties in collecting data from graduate and interns because they are scattered around Saudi Arabia and some of them are abroad. Also the number of the questions in the questionnaire was too long (40 items). As well as the time allocated to answer the questionnaire was 40-45 minutes.

## CONCLUSION

The mean score of the whole batches was average. There was no significant difference in the critical thinking between the batches. To enhance students' critical

thinking ability further research is needed to other respiratory therapy curriculum locally and internationally to compare their critical thinking ability with this study results. Using different critical thinking ability outcome measures are also recommended.

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