

THE CRITICAL THINKING SKILLS AND THEIR DEVELOPMENT METHOD

**Asst. Prof.Dr. Hana Rusi Saliu,
Prof. Dr. Myqereme Rusi,
Asst. Prof. Dr. Lulzime Lutfiu Kadriu,**

State University of Tetovo, hana.saliu@unite.edu.mk

State University of Tetovo, m.rusi@yahoo.com,

State University of Tetovo, lulzimekadriu@live.com

The world of the 21st century is characterized by expansion of technology, every day changes are applied and changes initiated in the workplaces, lots of flexibility is required in order to accept these changes and to perform various tasks. Today we have access to more information, which quickly accept, but to be able to function and work successfully, we must select the relevant information and those that do not matter to us. This sometimes requires more time and deeper thought. To be successful in performing common tasks and successfully solve the problems we face, we have to develop our thinking skills. In recent decades, an important factor for success in work and life is the expression of a specific form of thinking - the critical thinking. It has resulted in a change of curricula on many universities in the world, which realized the importance of developing thinking skills. As the main purpose of education within their curricula, they decided to implement the development of critical thinking of their students.

The democratic changes in society are reflected in the educational system and the level of education in primary and secondary education. Starting from conception, purposes and tasks of education, curriculum, teaching materials, education of the teaching staff, and other factors in this field, it is necessary that our school students are educated in the spirit of critical view of phenomena, situations like and information obtained in school.

Education should enable students to learn how to learn, using the process of thinking. Without critical thinking it can not be said that people are educated despite their academic achievements.

Students who think critically what they have learned from personal experience compare with the results of other authors, find solutions to problems, ask questions and seek answers, analyze the causes and consequences, show skepticism, seek to position their arguments and carefully analyze the arguments of others.

But the idea of critical thinking is not new. It dates from ancient times, from the time of learning and vision of Socrates, who 2500 years ago, using the method of questioning revealed that people could not rationally justify their knowledge. He noted the importance of the questions

that went deep into the essence of ideas before they accept as worthy of being trusted (according to Paul, Elder & Bartell, 1997). Socrates' method of research today is known as "Questions of Socrates" and regarded as the best strategy for teaching critical thinking. It outlines seven types of questions:

1. Clarifying questions: Clarification Questions:
2. Initial questions: Questions About the Initial Question or Issue:
3. Questions that probe assumptions: Assumption Probes
4. Questions to control the causes and facts, Reason and Evidence Probes:
5. Questions of the origin or source control question: Origin or Source Questions
6. Questions to control the implications and consequences; Implication and Consequence Probes:
7. Questions about viewpoints. Questions Viewpoint (Crawford co., 2005)

Socrates puts emphasis on the importance of taking care of making distinction between beliefs that are reasonable and logical than those that do not have sufficient evidence or reasonable grounds in favor of our beliefs. Socrates has inspired other philosophers of his time and those who came after to deal with the most complicated process of thinking.

Even today, many scientists work in researching of critical thinking. They orient themselves in different ways and areas of research for critical thinking. Some explore ways of development, several other provisions for critical thinking, and some others, areas of implementation and its implementation.

One of the first researchers in this field is Edward Glaser, who explored the possibility of developing critical thinking in the educational process (as, Despotovi , 1996). To certify his ideas, Glaser applied the critical thinking with students by exercising them for some critical thinking skills. As for exercise material he used newspapers, magazines and educational publications. He also constructed a test for measuring the skills that he exercised to his students. He gained results which testify the success and development of critical thinking on the experimental group (by, Kvaš ev, 1977). Also other studies such as the research of Brembek (by, Kvaš ev, 1977), Ruff (Ruff, 2005) D'Angelo, and Paul Walsh (by Walsh & Paul, 1986) and many other researchers in this field, testify to the fact that critical thinking is a skill that can be

developed and does not depend on the level of intelligence (ERIC identifier: ED297003) or education level (by, Tsui, 1998).

In order to research critical thinking, critical thinking skills should be researched, as all the researchers in this field have done, which according to various authors are different and this makes this area of research even more challenging. In this paper, divisions of skills provided by several authors will be mentioned such as Delphi report sorting, the sorting of Glaser and the one of Jeff Zwiers.

A breakdown of critical thinking skills is provided by a group of experts who gathered in 1990 to define critical thinking. According to the Delphi Project Report, critical thinking consists of the following skills: interpretation, analysis, evaluation, conclusion, explanation and self-regulation (Facione & Facione, 1996). ((1) Interpretation, (2) analysis, (3) Evaluation (4) Inference, (5) and explanation (6) self-Regulation.)

Edward Glaser is among the first scientist who systematically attempted to investigate critical thinking. As is the case with other researchers, Glaser also provides a list of skills that form the basis of critical thinking. According to him critical thinking skills are (Fisher, 2001):

- To identify problems;
- Identify tools that will solve that problem;
- To gather relevant information;
- Identify assumptions and unstated values ;
- To understand and use language with accuracy, clarity and discrimination;
- To clarify the facts and information;
- To evaluate the evidence and the statements;
- To recognize the presence of coherence between proposals;
- To extract conclusions and generalizations that will be proven;
- To test generalizations and conclusions;
- To make accurate judgment for certain qualities of everyday life.

In our research on critical thinking we decided to focus on the sharing made by Jeff Zwiers (2006). He emphasizes that critical thinking can be divided into twelve skills, such as analysis, synthesis, cause and effect, argumentation, evaluation, interpretation, problem-solving,

categorization and classification, comparison, empathy, communication and implementation. The author emphasizes that these skills with specific techniques can be introduced and implemented in the specific subject content and can lead to the development and improvement of the thinking process at the students.

Research Methodology

The experimental method enables more precise verification of the causes and consequences of occurrences that are researched. Because of this, in this research an experiment with two groups of subjects was conducted: experimental and control groups. The groups were formed based on their performance on the test to measure critical thinking WGCTA. This test was applied twice on the students. The first time was observed the level of critical thinking before experimental intervention factor (exercise) and the second test was to verify whether the experimental factor affected. Among the goals of this research, remains the goal of verifying the most efficient and successful method, leading to the development of critical thinking skills.

In this research we will try to answer the question:

Is the development of critical thinking skills influenced by teaching techniques used?

As a hypothesis and answer to the question posed in this research, we posed the hypothesis that:

There is a difference in the development of critical thinking skills depending on the techniques used in the exercise of critical thinking skills in the situation before and after exercise, between the experimental and the control group.

Critical thinking and its changes were measured by WGCTA test which consists of five subtests, which require the application of analytical thinking skills. Items of the test are composed of material extracted from newspapers, magazines or electronic media. Each subtest is composed of 16 statements. Lower theoretical result that can be achieved in testing is 0, while the maximum score for each subtest is 16. Five subtests which measure five critical thinking skills are: conclusion, identification of assumptions, deduction, interpretation and evaluation of arguments.

Teaching techniques used in research

To influence the development of critical thinking skills were used three techniques taken from the book of Jeff Zwiers (2006). These techniques are: Diagram of the main question, Three-scanted scale of convincing arguments and Table of academic language interpretation.

The diagram of the main question prepares students to provide relations of the evidence that enable their existing knowledge, to answer complex questions about the text. This activity teaches students to compare their thoughts and reasoning, with those mentioned in the text. Also, it requires to see both sides of an issue and to modify their existing knowledge when necessary (Zwiers, 2006, p. 200).

The three-scanted scale of convincing arguments is a very functional activity that helps student catch the process of weighing the criteria of both sides of an issue. Students engage in a mutual discussion or argumentative debate with a student or a couple. This is a way to understand how to think about very subjective ideas and how to weigh them. The goal is for students to work together, using the same criteria, and arrive to a conclusion - which reason is the best (Zwiers, 2006, p. 141).

Table of academic language interpreting is a very good way to help students develop the habit of thinking about multiple meanings, phraseology and other visual tools, such as analogies, metaphors and symbols. This activity gives good results in the language courses in natural sciences and social ones (Zwiers, 2006, p. 180).

These three techniques were repeated for three consecutive months and each of them was applied in four classes to exercise critical thinking skills.

Subjects

In this research, the research population consists of students of social sciences, meanwhile the research sample consists of first year students of the State University of Tetovo branch of Psychology and Pedagogy- class group. The number of involved students in the research was 100 (where were selected 200 students of both study groups with various tests) of which 50 consisted the experimental group and 50 the control group. Table 1 gives a detailed overview of the research sample.

Table 1. Number of students in both research groups presented by study group and sex

Study Group	N	Experimental group		Control group	
		Male	Female	Male	Female
Psychology	64	2	32	4	26
Pedagogy	36	1	15	1	19
N	100	3	47	5	45

In order to process the results the descriptive parameters will be calculated (M, SD) and t-test for determining the differences between the mid arithmetic of experimental group and the control one, before and after the exercises. In addition to quantitative analysis will also be qualitative analysis of the results obtained. The survey results are calculated with the statistical program SPSS 19.

Results and Conclusions

In this section we will give an overview of descriptive parameters such as the arithmetic middle (M) and standard deviation (SD) for the experimental and control group before and after the implementation of techniques for the development of critical thinking skills (exercise) for each subtest separately, and will provide information on the t-test between experimental and control group before and after exercise for each subtest.

Table 2. Validity of the difference on the arithmetic middles between the experimental and the control group in the first test situation after exercising for the subtests of the test for critical thinking

Variables	Group Expert.			Group Controll.		t
	N	M	SD	M	SD	
Conclusion	100	5.72	2.33	4.92	2.05	1.81

Identifying assumptions	100	7.92	2.14	8.32	2.22	0.91
Deduction	100	8.04	2.05	7.98	1.60	0.16
Interpretation	100	6.50	2.06	6.98	1.93	1.20
Evaluation of arguments	100	7.86	2.39	7.72	2.34	0.29

In Table 2 are given the results of validity at the arithmetic difference between the experimental and the control group, in the situation of first test before exercising the subtests of the test of critical thinking. T-test results show that there is no difference between experimental and control group in any of critical thinking skills. Two groups in the first test does not distinguish between any subtest, i.e. in the beginning of the experiment groups had similar levels of critical thinking skills.

able 3. Validity of the difference on the arithmetic middles between the experimental and the control group in the second test situation after exercising for the subtests of the test for critical thinking

		Group	Expert.	Group	Control.	
Variables	N	M	SD	M	SD	t
Conclusion	100	5.78	2.07	4.48	2.06	3.14**
Identifying assumptions	100	9.48	2.13	8.78	2.46	1.51
Deduction	100	8.68	1.78	8.34	1.94	0.91
Interpretation	100	6.68	2.00	6.28	1.96	1.00
Evaluation of arguments	100	8.74	2.24	7.60	2.01	2.67**

In Table 3 are given the results of validity of difference at the arithmetic middle between the experimental and the control group in the situation of second testing after exercising for subtests of the test for critical thinking, in order to verify in which critical thinking skills mostly

influenced the experimental factor - exercise and also to verify which technique has contributed to the development of critical thinking skills. If we analyze the findings in Table 3, we can see that we have gain a valid statistical difference between arithmetic middles on the skill *conclusion* in the second test and that difference is worthy in the level of value $p < 0.01$ ($t_{(98)} = 2.63$). Also valid statistical differences between the experimental and control group were obtained in the subtest *evaluation of arguments*, where the difference is worth at value $p < 0.01$ ($t_{(98)} = 2.63$). These results make us known the fact that exercises that were applied to the experimental group have affected on the improvement of the achievements of the subjects only on two critical thinking skills. The test that was conducted to measure critical thinking (WGCTA) measured five critical thinking skills, while the results showed improvement in only two skills.

Among the techniques that were used in this research to develop critical thinking and achieving better results of the experimental group contributed these ones: *The diagram of main question* and *The three-scanted scale of convincing arguments*, meanwhile *The table of academic language interpretation* has not contributed to improve the skills of interpretation to students.

The reason for the failure of development of some critical thinking skills is the fact that the techniques used did not affect the development of all skills that are measured by test WGCTA. It was found that *The main question diagram* and *The table of academic language interpretation*, although did not directly develop the skills which the test for critical thinking measured, have helped to improve the skills of evaluation and conclusion of arguments, while the technique *The table of interpretation of academic language* which should help to improve the interpretation of the various predictions although measured by the test directly, did not lead to improving of this skill. The failure is due to the fact that students were taught to learn in a mechanical way and in situations when needed to explain whith their own words and also describe the texts, they faced hardship. Even during the exercises they had repeatedly stated dissatisfaction they had because of the implementation of the technique of *The table of interpreting of academic language* – of the learning course, since it seemed difficult to interpret various texts. Another factor is the short time of the survey. Each of the techniques was carried only four times, resulting in failure on results of the subtest which measured the effects of the technique *The table of academic language interpretation*.

The main factor to develop critical thinking appears to be the school and teachers who work with students. Teachers should implement methods that do not require mechanical learn in their work, ask questions that can not be easily found in the text, but with analysis of the facts in the text, if the question posed can not be answered by pupils / students, they should not give them the correct answer, but they should motivate them to find the correct answers themselves by investigation. In the research of critical thinking as important factors which influence its

development, is the level of confidence, taking risks, level of knowledge, warm atmosphere in the classroom, understanding, being open-minded and psychological safety in the classroom. Which can be provided with interaction between teachers and students in a class, claim Khan and Vajs (by, Walsh & Paul, 1986). This fact shows the importance of the position of professor in the development of critical thinking skills and providing a suitable atmosphere in the classroom. He is also responsible for working methods used to clarify the subject. Therefore, in order to have a youth that have a developed critical thinking, who knows how to successfully face the problems of life, professors should contribute greatly through their work in developing a successful and conscious youth.

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