

ACTIVATIONAL TEACHING METHODS AS A TOOL FOR DEVELOPMENT OF CRITICAL THINKING

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Abstract: In education, the development of critical thinking is a long-term process that needs to begin in early school age. This period is important for the development of critical thinking, because a child starts school and is significantly affected by the teacher's way of work. A pupil is required to be able to think critically when starting secondary education. The main prerequisite of pupils' development of critical thinking is teacher's creative personality using a creative approach in education. This paper deals with the analysis of activational methods and the application of Philosophy for Children program as a tool for development of critical thinking in educational process of pupils at secondary education level. Within the Philosophy for Children programme, we have implemented activational methods in the education process. The research design was quantitative, and the data was acquired based on the experimental method. The research results confirm the benefits of the Philosophy for Children program in educational process with emphasis on its potential to develop pupils' critical thinking owing to its principles and characteristics.

Keywords: critical thinking, activational methods, philosophy for children, education

1 Introduction

The explosion of information that the world offers us nowadays makes us learn to work with them adequately and, more importantly, to select them in terms of their real use. Reflecting this situation, there is a need to teach pupils to think critically in an adequate way. This is also related to the changing requirements for education in schools, which we must implement in our education system. We see this as one of the current challenges of our education system. The issue of developing critical thinking of pupils is a very timely and often discussed topic today. The level of critical thinking development determines the pupil's success not only in the school, but also in the environment outside of school. In today's information society, people's ability to deal with different life situations flexibly, critically, creatively and inventively is required. The need for the implementation of methods and strategies for developing creative and critical thinking in the educational process in Slovakia is also pointed out by the results of the last three cycles of the PISA international assessment (2012, 2015, 2018), in which Slovak pupils reached considerably lower score in all monitored areas than the average in OECD countries. The negative trend of decreasing performance in all monitored areas confirms insufficient development of creative and critical thinking among pupils in Slovakia. Pupils are not able to work independently and use higher cognitive operations (synthesis, analysis, evaluation and creativity). Widely available information introduces the need to teach pupils how to work with them and use them in a meaningful way through critical thinking (Higgins, 2014). Critical and creative thinking plays an exceptional role in teacher education, because it is teachers who can influence the skills of critical thinking among the school-age population. The main prerequisite is the teacher's knowledge of various methods and strategies for development of critical thinking. Psychodidactic competencies of a teacher include skills and abilities, thanks to which the teacher is able to process the learning content and manage teaching in order to develop (meta)cognitive processes of pupils, implement teaching strategies and assessment activities that have the potential to contribute to the development of pupil's personal and cognitive characteristics (Duchovičová, Petrová, 2016). The most significant obstacle to achieving the above-mentioned goal, while developing psychodidactic competences in teacher education in practice, is teachers' limited knowledge of how to develop critical thinking in teaching (Williams, 2005).

2 Critical and Creative Thinking

The topic of developing critical thinking has been the subject of scientific research for several decades. Important foreign authors who have been involved in studying critical thinking include Ennis (1985), Lipman (1988), Bailin (2002), Paul, Elder (2006), Scriven, Paul (2007), Willingham (2010), Lai (2011), Halpern (2014) and many others. Lipman (1988) argues that critical thinking is, in contrast to conventional thinking, more complex, because it involves not only mental processes for problem-solving and decision-making, but also thinking based on which people make judgments. Critical thinking is a disciplined process of active conceptualizing, analyzing, applying and evaluating the gathered information (Scriven, Paul, 2007). In Slovakia, the concept of critical thinking in terms of teaching began to emerge in the 1990's, when teachers from kindergartens to universities gathered around non-governmental organizations that covered international projects aimed at influencing educational strategies of teachers and educators (Porubský et al., 2014). Nowadays in the Slovak Republic, Kosturková (2016), Velmovská, Bartošovič (2016), Duchovičová et al. (2016; 2017; 2018; 2019), Kosturková, Ferencová, Šuťáková (2018); Kosturková, Ferencová (2019) and others focus on critical thinking in their studies.

The term critical thinking has been used in education for several decades. It represents a higher way of thinking that begins with information and ends with a decision (Petrasová, 2008). A critical thinker assesses new information, examines it carefully and critically from multiple perspectives, makes judgments about its credibility and value, and assesses the importance of new ideas and information for his/her needs (Grecman et al., 2000). Critical thinking is the ability not to succumb to the imposing influence of foreign thoughts and opinions, but to evaluate them strictly and correctly in order to see their positive and negative aspects. Critical thinking itself is based on attitudes and abilities to gather and assess relevant information, draw reasoned conclusions, address the problem on the basis of relevant criteria, assess the assumptions and implications of decision-making (Snyder, Snyder, 2008). To think critically means for Halpern (1999) to evaluate the outputs of the thinking process, i.e. what is the quality of the solution or how well a problem is solved. The process of critical thinking occurs at the moment when a problem arises, while an individual is able to raise questions leading to evaluation, argumentation, statements and conclusions. This process includes problem-solving, probability calculations, formulation and drawing of conclusions. Critical thinking is a conscious process, so we can practice and develop its individual components at the same time. Based on the Delphi report, Facione and Facione (2008) defined critical thinking as a process of purposeful and self-regulatory reasoning, careful consideration of evidence, contexts, conceptualization, methods and criteria. Several definitions of critical thinking suggest that it is based on mastering simpler cognitive skills. In relation to previous baselines, Tileston (2005) lists the following skills of critical thinking:

- inductive reasoning (where we classify e.g. cause and effect; open problems, analogies; drawing conclusions; identifying relevance, relationships; problem-solving);
- deductive reasoning (using logic, reasoning; understanding contradictions; spatial problems; syllogisms consisting of a set of three statements, where a conclusion is drawn from two assumptions);
- evaluative thinking (in form of differentiating facts and opinions; credibility of the source; identifying the main problems; distinguishing assumptions; detecting stereotypes; evaluating hypotheses, classifying a set of information; assuming consequences).

It is important to have critical thinking, because it enables pupils to deal effectively with scientific, social, and practical problems

(Sharikova, 2007). In the context of developing critical thinking, it is crucial to establish assumptions, consider their accuracy, take note of them from different perspectives, and, finally, make decisions based on convincing evidence (Castellano et al., 2017). Critical thinking is closely related to creative thinking, which is characterized by creativity and originality. The result of this thinking is a product that is valuable, new, useful, usable, and original (Žák, 2004). According to Tóthová (2006, p. 15), „*there are several definitions of creative thinking that are based on different theoretical concepts (Gestalt, psychoanalytic, behavioral psychology), are differently oriented (e.g. personality, abilities, intellectual activity, process, product or more abstract questions concerning the share of conscious and unconscious regulation, convergent and divergent thinking in the creative process, etc.), and usually take into account only some aspects or address only part of the problems related to the definition of this concept.*“ A creative person focuses his activities on goals that have not been known so far. To achieve these goals, it is necessary to master things that have already been discovered and dealt by someone else. Adequate education and good knowledge of the issue are essential in the creative process (Tuma, 2001).

Kosturková (2016) points out that the school's vision should be to teach pupils to orient themselves in life, and by using the principles of critical thinking in education, the school prepares pupils more effectively for the future. People need critical and creative thinking to understand issues, solve problems, and make appropriate decisions. The school's duty should also be to prepare students to participate in society as citizens, where the ability to think critically and creatively can help significantly.

3 Activational Teaching Methods

In order to improve the quality of education in the Slovak Republic, there are constant efforts to change education, such as the new state curriculum, which changes the situation only partially. The shortcomings in education and the related poor results of our pupils have been pointed out for a long time, and in today's education it is not enough to teach traditionally, but innovative methods, approaches and learning behaviours are needed. This issue in the context of the new curriculum has begun to be abundant, especially in terms of improving the quality of education and streamlining the results. However, real and effective change requires the coherence of several elements. In today's schools, the traditional form of the educational process is dominant: a lesson based on the frontal work with pupils, explanation, interpretation, and speaking of the teacher. Following on practice, the application of changes at the level of educational forms and methods is perceived as unique and demanding. Although teachers are informed about new methods from different sources, many times they choose a more proven and widespread method of teaching. A suitable and well-known group is expected to be activational methods, the wide spectrum of which allows precise selection for the needs of particular educational process according to the learning content, and pupil and teacher characteristics. It is important that teachers abandon traditional methods of education and apply more creative methods to enhance creativity and creative thinking, critical thinking, pupils' independence, their ability to cooperate and, last but not least, the development of self-reflection and self-evaluation. Despite the fact that literature offers a number of methods, forms and concepts of teaching that many teachers know and even put some of them in use, there are still many teachers who do not use these methods for the benefit of pupils. There is a need for a qualitative change from reproductive cognition created and acquired through cognition, remembering, and basic understanding, to active and productive cognition that is new to an individual, created through analysis, synthesis, evaluation, creative and reflective thinking (Grofčíková, Kozárová, 2017).

We understand the methods and strategies of the educational process as a system of coordinated teaching activities of a teacher and learning activities of a pupil towards achieving the set educational objectives. The development of critical and

creative thinking can be achieved by methods that involve pupils in active thinking, pupils must be encouraged to introduce their own opinions, to rationally choose from two competent ideas, to cooperate with others, to discuss responsibly about specific issues, to respect different opinions and realize how experience can influence people's attitudes and perceptions (Grecmanová, 2000). Activational methods are defined by Fenyvesiová (2013) as didactic procedures leading the teaching, so that educational goals are achieved primarily based on the pupils' own learning activity. In this way of education, there is a change in the role of pupils from passive recipients to active participants in the educational process in terms of individual cognitive processes (in particular, active processes of acquisition, updating, processing, evaluation, and generalization or application of new knowledge). Activational methods are most often divided into (Kotrba, Lacina, 2011):

- problem-based learning (heuristic method, black box method, confrontation method, paradox method, self-compilation task, working with text, free writing, mental mapping, written work, predictive task, etc.);
- didactic games;
- methods of group teaching and cooperative learning;
- discussion (dialogue) methods (brainstorming, brainwriting, Method 653, rounds, carousel, snowballing, visitors, goldfish bow technique, lecture discussion, chain discussion, discussion based on a thesis, discussion based on a presented paper, Hobo method, Philips 66, consensus method, targeted question method, Gordon method, debate, etc.);
- situational methods (case methods);
- staging methods (role plays, dramatization);
- special methods (project teaching, responsiveness exercise, icebreakers, research methods, etc.).

Literature offers a number of activational and innovative methods with only Čapek (2015) describing about 500 teaching methods and strategies in his publication. We will not describe them all in detail, but name just a few of them, which have been mentioned more and more recently. Concepts such as projective, group, cooperative and problem-based teaching and methods, such as Socratic method, questioning method, case study, staging method, mental mapping, discussion, etc. are suitable for developing critical thinking.

3.1 Philosophy for Children Program

Very well-known, but in practice little used in Slovakia, is the so-called Philosophy for Children program that was designed to respond to the inadequacy of schoolwork in developing the thinking of children, pupils, and students. The Philosophy for Children program (hereinafter "P4C") includes a number of activating methods that develop critical thinking, such as literary stories, discussion, role-playing, dramatization, drawing and many more. Critical thinking is included in the objectives of this program, which is actively implemented in different variations in the educational practice of many countries around the world. The advantage of the program is that it includes a variety of methods, topics and activities that can be applied flexibly. Lipman (2003), the founder of the program, emphasizes the impact of the community in which we read, listen, talk, write, and justify. These skills are developed through the practical implementation of the philosophy absent from the Slovak education curriculum.

A problem-solving group in the P4C program using collective effort is called a seeking community. Members of the seeking community are given space for independent and free thinking, reflecting on the opinions of others and, at the same time, for the revision of their own opinions.

The P4C program uses typical literary stories designed by the founder of the program Lipman with his colleagues. A philosophical literary story is used as a method providing space to reflect on many issues of life. It is an incentive from which the participants of the seeking community derive questions for joint review. In the educational process, it is essential to include

problematic situations that encourage flexibility in creating new solutions, assessing them using different criteria, and encouraging the creation of questions. Developing the skills to correctly formulate questions helps pupils to critically assess the excessive amount of information they are flooded with on a daily basis. Reading a literary story is usually followed by questions in smaller groups. The questions created are mostly of a philosophical nature, they are recorded in a visible place, and a question that the members of the seeking community want to solve, is chosen by voting.

In the process of discussion in this program, pupils thoughtfully process opinions of others, they are compelled to listen carefully in order to choose correct words to solve the problem – exploring alternatives and considering conflicting views. The effort to think jointly, to define concepts, to remove prejudices, to consider different aspects, to consider reasons is encouraged. A discussion within the P4C program is not the same as a debate, because the debate is aimed at promoting views of an individual (victory of the individual), while the discussion is aimed at solving the problem together (victory of the group). The discussion may be supplemented by introducing activities related to the problem or its parts. The choice of activities depends on the facilitator (teacher) or the person who leads the discussion. Activities within the P4C program include various exercises focusing on speech, visualization, and expression through movement and drama.

As mentioned above, there is a number of activational methods that develop critical and creative thinking, for example through essays, the Socratic method, the E-U-R teaching and learning strategy, brainstorming, staging methods, mental mapping, questioning methods, discussions and more. The P4C methods include many similar features to the above methods, while offering several different approaches to develop critical thinking along with other skills. Among the activational methods of the P4C program developing critical thinking we include e.g. problem-solving discussion focused on question-making and exercises focused on expression through speech, art, drama, and movement. Lipman (2003) proposes the inclusion of critical thinking as a separate course for teachers, in which teachers would acquire basic knowledge and skills to develop pupils' thinking. The author suggests that without such a course, it is difficult for teachers to explain to their pupils the importance of developing not only critical, but also creative and committed thinking, and highlights the development of thinking through the P4C program.

In the field of the P4C program, a number of studies, publications, and researches are underway demonstrating the impact of the program on the level of critical and creative thinking, e.g. Garcia-Moriyon et al., 2005; Othman Hashim 2006; Topping, Trickey, 2007; Lam, 2012; Fair et al., 2015 and many others. A significant source of knowledge on the subject is the P4C meta-analysis of the effectiveness of the program (Yan et al., 2018) providing broad understanding of the impact of program methods on cognitive performance of pupils. Meta-analysis is described as a method of combining the results of several independent researchers from a common field, while the method performs statistical analysis. The authors analyzed researches and studies from 2002 to 2016, which examined the connection between the seeking community, philosophical thinking and socio-psychological improvement of personality. From more than a thousand researches in this field, the authors selected ten research studies eligible for their analysis using strict criteria. The research was required to include a quantitative methodological approach, both experimental and control groups, cognitive ability measurement and statistical evaluation. The variables included the measurement of cognitive results, such as reasoning ability, comprehension ability, and general cognitive ability. Meta-analysis gave us insight into the ways, in which the level of cognitive abilities can be measured. According to the findings of this meta-analysis, the P4C program showed a slight positive impact on students' cognitive performance. Cognitive outcomes include general cognitive skills, reasoning skills, creative thinking, reading and listening comprehension.

According to meta-analysis, in all these types of cognitive outcomes, the P4C program has a large positive impact on pupils' judgment, and a slight impact on other cognitive areas (Yan et al., 2018).

In the context of the above, we focused on the validation of the Philosophy for Children (P4C) program as a tool for developing critical thinking in education.

4 Research

The subject of the study was the Philosophy for Children program and its application in the educational process at the level of secondary education, specifically for pupils of the 1st – 4th year of secondary school, and the identification of its impact on the development of critical thinking. The main aim of the research was to determine the impact of the Philosophy for Children program on the development of critical thinking of secondary school pupils (1st – 4th year of secondary school).

Based on the above-mentioned goal, we identified two research issues:

1. RP: How does the use of the Philosophy for Children program in education impact the development of critical thinking of secondary school pupils over a period of two to three months?
 - We assumed that: pupils to whom the Philosophy for Children program has been applied in an experimental way reach better level of critical thinking than pupils to whom the program was not applied.
2. RP: To what extent can we develop critical thinking by implementing a model lesson of Philosophy for Children in a time span of two to three months?

4.1 Research Sample

The research sample consisted of 82 pupils of the 1st – 4th year of secondary school. Sampling was subject to availability, but also to intentionality in order to ensure equal classes. The research sample was divided into two groups: one group being experimental (EG), which consisted of 40 pupils. Pupils of this group attended one lesson a week for the period of two and half months within the Philosophy for Children program, which was applied to the subject Civic education. It is difficult to compare the application of the Philosophy for Children methods with another program in school education owing to its uniqueness, and so the second, control group (CG), consisting of 42 pupils, did not participate in any program. The experimental and control groups were randomized.

4.2 Research Methods

The character of our research was quantitative, based on a pedagogical experiment. We chose experiment as our research method, because this method, as the only one of the research methods, can prove causal consequences of pedagogical activity. As part of the experimental plan, we used the pre-test and post-test, which both groups underwent.

The most widely used tool for determining the level of critical thinking is the standardized psychological test W-GCTA, known as Watson-Glaser test (Watson, Glaser, 2000), which has been used since 1926. There is also the Lawson (1999) test of critical thinking, however, it is designed for respondents – psychologists, so we did not consider its use. We did not use the Watson-Glaser test for several reasons. One of them is that Watson-Glaser test belongs to the hands of psychologists. This was also admitted by Kosturková (2016) who justifies its use by its great importance for pedagogy. Here it is necessary to mention that the test contains 80 exercises and we did not have sufficient time for its use due to the realization of agreed meetings with the students of the experimental group. The fact is

that the individual Watson-Glaser tests are extensive, and it was not in our competence to change their scope and wording. Our critical thinking tool consisted of 12 questions and the time limit for solving the test was 12 minutes. When evaluating the critical thinking tests, we took into account the factual correctness of the answer, while we also accepted answers with grammatical or spelling errors. We did not evaluate the “eloquence” of the answers, but the ability to encompass the essence to solve the problem. Pupils’ free answers in open questions may have some influence on the evaluation of the test, so the evaluation was carried out by two persons who followed the guidelines for the evaluation of the critical thinking test.

In a pedagogical experiment, a dependent variable represented the level of pupils’ critical thinking. An independent variable was the activities within the Philosophy for Children program (discussion, questioning, dramatization, role-playing, etc.). By performing the experiment in the control and experimental group (EG and CG), we obtained certain score in the tests we evaluated.

To evaluate the data, we used descriptive statistics, analysis of the paired t-Test for average value and analysis of the difference score (difference between the post-test and pre-test), which focuses on the change between the pre-test and post-test of individual groups. The obtained results were processed and analyzed by the computer program Excel for descriptive statistics methods.

5 Results and Discussion

We assumed that pupils to whom the program Philosophy for Children will be applied experimentally in teaching will achieve a better level of critical thinking than pupils to whom the program will not be applied. We were also interested in the extent, to which we could develop critical thinking by implementing a model class through the P4C program over a period of two to three months.

Table 1 presents descriptive statistics of the pre-test and post-test results of the groups (mean, minimum, maximum, standard deviation, mean error, median) – the scores for the control and experimental groups.

Table 1: Descriptive Statistics on Pre-test and Post-test Scores for Experimental and Control Group

	M	N	SD	SEM	Min	Max	Median
pretest_EG	8.925	40	3.253	0.514	3	15	9
posttest_EG	12.325		3.765	0.595	5	19	13
pretest_CG	8.548	42	2.461	0.380	4	13	9
posttest_CG	8.857		2.374	0.366	4	13	9.5

(N – Count, M – Mean, SEM – Standard Error, SD – Standard Deviation, MIN - Minimum, MAX - Maximum, MEDIAN – Median)

Figures 1 and 2 show box plots which, in addition to a graphical representation of the scores of the experimental and control groups in the pre-test and post-test, also contain descriptive statistics data (unrounded average, minimum, maximum, and median).

Figure 1: Box Plot: Pre-test Scores for Experimental and Control Group

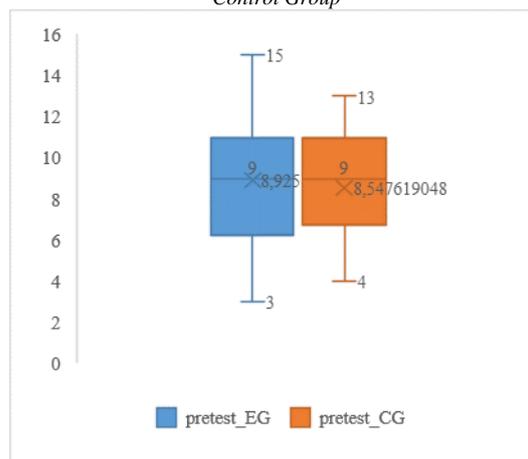


Figure 2: Box Plot: Post-test Scores for Experimental and Control Group

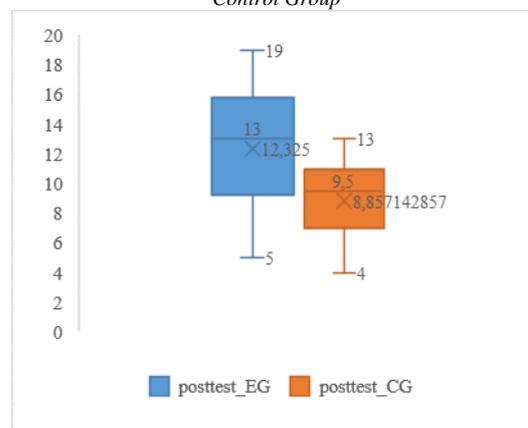


Table 2: Paired t-Test for Average Value

	M	df	t	P
pretest_EG	8.925	38	-9.522	< 0.001
posttest_EG	12.325			
pretest_CG	8.548	40	-1.394	< 0.086
posttest_CG	8.857			

(df – Degrees of Freedom, t-Test Statistics, P – P-value)

The results of the t-test show that the differences in group scores between the pre-test and post-test are significant at a level of statistical significance <0.05.

5.1 Difference Score Analysis for Control and Experimental Group

The difference score was obtained as the difference between the score achieved in the post-test and the score achieved in the pre-test. Table 3 shows descriptive statistics of the difference scores of the experimental and control groups.

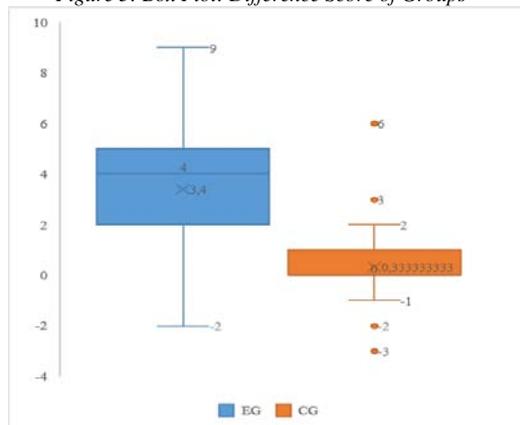
Table 3: Descriptive Statistics on Difference Score for Control and Experimental Group

	M	N	SEM	SD	MIN	MAX	Median
EG	3.4	41	2.193	0.347	-2	9	4
CG	0.333	42	1.476	0.228	-3	6	0

The average difference score in the EG is 3.4 (standard deviation 0.347), which means that EG pupils achieved a better score in the post-test than in the pre-test. The average CG difference score is 0.333 (0.228), which means that CG pupils also

achieved a better score in the post-test than in the pre-test, but only to a small extent.

Figure 3: Box Plot: Difference Score of Groups



To assess whether the difference scores between the experimental and control groups are statistically significant, we used a two-sample t-test for equality/inequality of variance. In order to find out the uniformity of variance, we used an F-test for uniformity of variance.

Table 4: Results of F-Test Difference Score for Equality of Variances

	M	df	F	P
EG	3.4	39	2.208	< 0.007
CG	0.333	41		

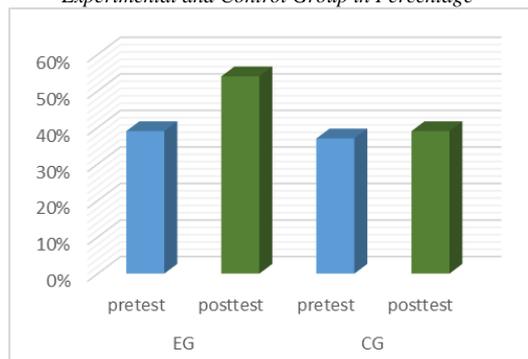
Table 4 shows the results of the F-test for equality of variances in groups. The test criterion value F is 2.208 and the corresponding P value is 0.007, which means that at the level of statistical significance <0.05, there is a significant difference in the variability of difference scores between the experimental and control groups, so we further used the t-test for inequality of variances.

Table 5: Results of t-Test Difference Score for Inequality of Variances

	M	Df	t	P
EG	3.4	68	7.392	< 0.001
CG	0.333			

Table 5 shows the results of the t-test for inequality of variances in groups. The test criterion value t is 7.392, the respective P value is <0.001, which means that the difference scores of the experimental and control groups are significant at the level of statistical significance <0.05. The achieved level of critical thinking in the pre-test and post-test and the difference in the scores achieved by the groups can also be seen in the summary Figure 4.

Figure 4: Comparison of Pre-test and Post-test Results for Experimental and Control Group in Percentage



Based on the results of the experiment, we conclude that our assumptions were confirmed. Pupils to whom the P4C program was applied in their classes have achieved a higher level of critical thinking than pupils to whom this learning strategy was not applied. In view of the fact that in the experimental group the level of critical thinking increased by only 15% thanks to the P4C program within two months and a half, we conclude that this is not a significant, but rather a moderate development of critical thinking. However, we are of the opinion that the long-term or year-round introduction of the P4C program into the educational process would develop critical thinking in a much more effective and significant way.

4 Conclusion

This paper refers to the need to improve the level of critical thinking of Slovak pupils, because pointing out shortcomings in critical thinking has been present in our society for a considerable period of time without significant improvement. We cannot expect a change in the level of critical thinking in the short term. On the other hand, we emphasize that critical thinking can be developed by teachers using targeted methods, and we appeal to the application of activational methods in the educational process. Some activational methods are also used within the P4C program, while all methods in the program are designed to develop critical, creative and committed thinking. However, the process of this development does not take place independently. These kinds of thinking overlap each other, so it is difficult to observe only one kind of thinking. In addition, emphasis is also placed on developing other abilities and skills, such as writing, because methodological manuals also include written exercises. Attention is paid mostly to reading, and the philosophical literary story serves primarily to introduce the topic and to follow model situations of problem-solving.

Quantitative research has not revealed highly innovative results mainly due to the fact that several studies of critical and creative thinking based on the impact of the P4C program on different ages have been conducted abroad in the past (Daniel, Auriac, 2011; Dunlop, 2015; Siddiqui, Gorard et al. 2019). Nevertheless, the research provided a more comprehensive picture of the use of methods of the Philosophy for Children program in secondary schools in Slovakia. It is important that teachers know the theoretical and practical basis of critical thinking through which they should develop the ability to use activational methods to enhance critical thinking. Based on our research, we consider the application of the Philosophy for Children program or its parts to be an effective tool in developing critical thinking. The challenge of encouraging the development of critical thinking in schools should not be just a phrase, but it but should be transformed into a practical and systematic activity affecting in particular teachers who should activate pupils, require greater responsibility for their decisions and support the presentation of their own ideas. Gažovič and Markoš (2017) point out that a critically thinking person does not feed on his mistrust. Such a person sees not only people who cannot be trusted, but also those who deserve his/her trust.

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Primary Paper Section: A

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