From Collaboration to Solutions: Encouraging Collaborative Problem Solving through School Practice

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Abstract: *The aim of this paper is to present a viable, psychologically based framework designed for systematical promotion of the adolescents' capacities for collaborative problem solving and possibilities for their cultivation through everyday school practice. Specifically, a model for designing teacher-training programs is proposed, wherein several elements of effective collaborative problem solving are drawn together.*

Keywords: *problem solving; cooperation; peers; socio/emotional competencies; intervention study.*

1. INTRODUCTION

The contemporary, although not new, orientation of education policy in Serbia towards competence-based education affirmed the constructivist approach to learning, through peer cooperation, exchange and reflection, that is, collaborative formulation of solutions and conclusions. In the competence-based education, the student is expected to be active, to have a developed sense of cooperation and to be able to present and explain his/her point of view. In the same time, the teacher is expected to be sensitive to these competencies and to support them with appropriate work methods. The main goal of the project "The PEER model of collaborative problem solving: Developing young people's capacities for constructive interaction and teamwork" is to develop a teacher training program for the implementation of teaching oriented towards cooperative problem solving and building the capacity of young people for constructive interaction, as well as to monitor its implementation and ensure the positive effects of such work.

2. CONCEPT AND METHODOLOGY

As the current and rich research evidence clearly shows, collaborative problem solving (CPS) is the principal way of dealing with scientific and civic issues in the contemporary world. It is generally known that joint work to solve problems is more creative, effective and productive than individual work. In addition, working together is the only way to approach complex, socially relevant problems, which require a consideration of multiple sides and factors, and often call for an interdisciplinary perspective [1, 2, 3]. Consequently, the need to develop young people's problem-solving skills and prepare them to work effectively in teams within their future professional and social environments has also been specified as a major educational goal, which is already case with the educational system in Serbia [4, 5].

As Piaget originally proposed (1941/1999, 1950/1999, 1960/1999), the peer interaction can spur the development of cognitive and other competencies, such as socio-emotional ones, through the process of coordination of multiple perspectives and consequent decentration from one's original point of view [6]. According to this point of view, we can see CPS in peer groups as a method of learning that allows individual group members to arrive at a deeper understanding of the problem at hand and the ways it may be soled.

The above benefits of peer interaction and CPS are contingent upon certain conditions. For example, participants should be able to share different perspectives openly and resolve socio-cognitive conflict constructively [7, 8].

As the empirical evidence shows, it is possible to teach young students the language and social skills

that can help them become more productive participants in CPS. As demonstrated primarily through the continuous efforts of Mercer and his research group [9], through specifically designed educational programs students can learn how to think together, while also benefiting in terms of their individual competencies, i.e., achieving better school grades. In addition, students could be taught to communicate effectively and respectfully, to suspend their own values, beliefs and judgement when interacting with others and to take an active part in conflict management and resolution [10].

Finally, adolescence is arguably the optimal period to systematically support the competencies and capacities relevant for constructive peer interaction and CPS. This is, for one, because adolescents possess the necessary cognitive and socio-emotional prerequisites to grasp and consider different views for the sake of argument, but, moreover, they are strongly orientated towards and seek the company of peers [11]. Lastly, high school students are one step away from entering higher education and the world of work, where teamwork is crucial and associated with higher engagement.

2.1. Methodology

The Project will employ a mixed-methods approach. First phase' objective is to develop a PEER model-based training for adolescents based on data about individual and group-level factors of (un)productive peer interaction; personal themes through which these factors appear in CPS; and adolescents' past experiences with and attitudes towards CPS. Data will be collected through two qualitative studies, using individual interviews with participants and observations of their spontaneous behavior during CPS.

The objective of the second phase is to implement the PEER model of training during teaching/learning process and test it in two intervention studies. The first study will examine the training's effects on two group-level variables: quality of interaction during CPS; and quality of the solution to the presented real-world (complex) problems. In addition, we will use the data from this study to make final adjustments to the PEER model-based training. The second intervention study will test the effects of the final version of the training on two individual level variables: scientific and civic problem-solving competencies; and participants' subjective experience of CPS. Both intervention studies will use an experimental design with repeated measures (pretest - training -posttest). The experimental group will receive the PEER model-based training and have the opportunity to practice CPS in triads with an experienced instructor providing scaffolding and digital media as resources The control group will also be engaged in CPS, but will not receive any training or scaffolding.

2.2. The PEER intervention model

Proposed model for designing teacher-training programs focuses on several elements of effective collaborative problem solving. First, the model refers to the role of personality differences (the "P" element) in joint peer activities and highlights the need to teach young people to appreciate and benefit from the participation of different personalities in CPS. The model's second element points to the necessity to introduce adolescents to the rules and values of exchanging ideas in dialogue (the first "E" of the acronym), so as to raise the quality of their interactions and prevent these from turning into persuasion and conflict, or ending in disengagement and withdrawal. Third, the model assumes that–to be able to respect each other's different personalities and follow the rules of constructive dialogue–young people also need to develop their emotional intelligence (the second "E" of the acronym) and socioemotional competencies more generally. Finally, the PEER model proposes that effective CPS also depends on the availability of external resources (the "R" element), such as scaffolding provided by an experienced instructor and digital media.

Compiling these four elements, the described model not only provides an original synthesis of available knowledge on the psychological factors contributing to CPS, but will serve as the groundwork for developing an evidence-based CPS training program.

3. CONCLUSION

Competencies such as collaborative problem solving, critical thinking, ability to examine issues of global and local significance, ability to understand the perspectives of others and to evaluate actions and consequences are of the critical importance for the young people. Education systems that embrace the need for such competences are likely to be the ones that equip students to live in an interconnected and diverse world and to benefit from it [10].

The above described implementation of the PEER model should yield major insights into the possibility of developing adolescents' capacities for collaborative problem solving and using it to promote their individual competencies. The best place to implement an intervention study based on this model is the regular educational process because school is the only socialization agent that has the possibility of systematic and comprehensive influence on young people.

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