

CREATIVITY IN TEACHING MATH TO STUDENTS WITH INTELLECTUAL DISABILITIES

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Abstract

Developing creativity and thinking outside the box is key in modern education. When students are able to combine ideas, techniques, approaches that enable them to solve problems in different ways we can assert that they were taught creativity in their mathematical instructions. Most tests for evaluation of mathematical creativity measure the flexibility, fluency, and originality of student responses. Creativity tends to be hindered in the case of students with mild intellectual disabilities. Studies on the application of creativity in the teaching of mathematics to students with intellectual disabilities are limited. The article analyzed the academic achievement in mathematics and development of students' creativity.

Keywords: creativity, mathematics, development, teaching, intellectual disability, education.

1. Introduction

Creativity within the education system is often associated with subjects like art, music, literature, and language. For many years, education was based on preparation for a profession or job. Children are introduced to ready-made forms of life and opinions to which they had to adapt, or many difficulties and failures awaited them (Đorđević i Đorđević, 2008). The task of the current school system is to be productive, instead of reproductive, dynamic, instead of static.

For a long time, researchers have pointed out that encouraging creative thinking and problem solving is a way of preparing for life (Dewey, 1897; Guilford, 1950; Vygotsky, 1967; Warnock, 1978). Encouraging creativity is no longer necessarily related to certain subjects but education as a whole.

Two elements are taken as features of creativity: the first refers to the fact that the creative individual combines experiences and sees things in a new way, and the second that the creative individual produces new and fresh ideas (Huzjak 2006). Winner (2005) states the division of creativity with capital C and minor c. Creativity with a small c means children who independently discover the rules, skills and strategies for solving problems, and creativity with a large C involves changing or transforming which requires knowledge and experience (Huzjak, 2005 in Stankovska, 2020).

The problem with standardized testing models and the pressure placed on students for better academic achievement can interfere with the creative process. This pressure for standardized academic achievement is one of the main hindrances to creativity in children with mild intellectual disabilities. The focus on academic achievement in their education neglects the importance of creativity in their individual development and personal growth. This article explores the possibilities of applying creativity in teaching mathematics to students with intellectual disabilities (ID).

Creativity cannot be learned, but only practiced. More training allows for better results. This is important in understanding creativity in children with ID and other developmental disabilities (Andrić, 2016). Prejudice exists when it comes to children with ID and expressing creativity, especially in certain domains (acting, poetic expression, ballet, etc.). We argue that creativity can be trained and that it arises from maturation and experience and can be trained in subjects like mathematics.

The default abilities are sensory and practical. This is shown in the following chart.

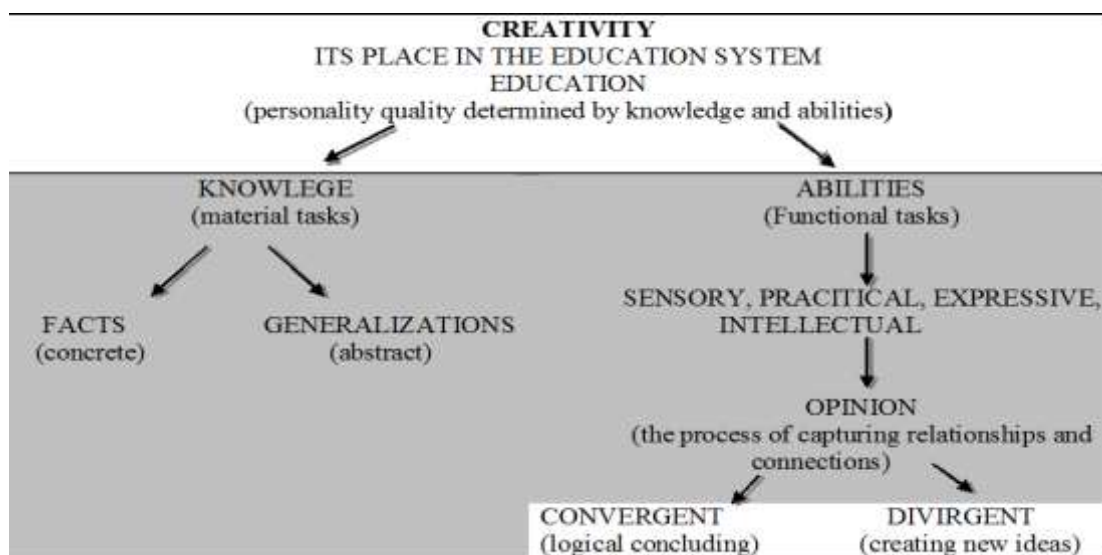


Chart 1. *The default abilities are sensory and practical by “On developing creativity in mathematics teaching” Dr. Vojislav Andrić (Andrić, 2016).*

The article analyzed the academic achievement in mathematics and development of students' creativity.

2. Creativity in teaching mathematics

Today, creativity is considered a trait that every person possesses, not just rare individuals (Renzulli & Reis 1997; Renzulli, 1999; Cropley, 1999; Sternberg, 2003, 2006, George, 2005; Runco, 2007). It is expressed in several ways (Treffinger, Young, Selby & Shepardson, 2002) and implies that a person notices a problem, but also solves it (Runco, 1993). In the development of mathematical creativity, the developmental-psychological and individual abilities of students are encouraged, the methodological approach is adjusted, the goals and tasks of teaching are concretized and appropriate contents are chosen (Kadum, 2003; Koludrović, 2008).

Paul E. Torrance (1965) proposes five principles by which the teacher can encourage the creative potential of students during classes, namely respect for unusual questions, and respect for imagination and unusual ideas of students, showing the value of these ideas in teaching and life. Play and creative activities have been shown to influence more developed neuropsychological functions and early mathematical skills, such as classification, serialization, shape identification, and understanding of the relationship between parts and wholes and later success in mathematics (Gelfer & Perkins, 1988; Piaget, 1962; Wellhousen & Kieff, 2001; Williams & Kamii, 1986), as well as on social relations (Cheyne & Rubin, 1983; Pederson, Rook-Green, & Elder, 1981; Pepler & Ross, 1981; Saltz, Dixon, & Johnson, 1977).

Their creativity process often comes spontaneously and therefore mathematics classes must intensify the activities related to creative behavior and give the children with intellectual disabilities the opportunity to express. Since the goal of every education process should be student's improvement in every aspect, the mathematics classes should also focus on enhancing creative thinking of students with disabilities, by allowing students to make initiative, by giving them the right questions, by using different interesting experiments, by insisting on diverse way of solving a certain mathematical problems (Andric, 2016).

3. The possibilities of applying creativity in teaching mathematics to students with intellectual disabilities

Children with intellectual disabilities are able to have creative thinking and to develop unusual strategies for solving problems with minimal guidance. It is shown that they can achieve the level of guided creativity (Taylor, 1976), therefore the ability to be creative does not necessarily correlate with intelligence, but with the proper guidance.

There are a large number of children who have specific difficulties in mathematics and have been shown to have heterogeneous difficulties and require individualized approaches to solving (Ackerman & Dykman, 1995; Geary, Hoard, & Hansom, 1999; Geary, Hamson & Hoard, 2000). The need to develop not only mathematical competencies but also the development of their thought processes was also pointed out (Rasanen & Ahonen, 1995). It is very important to enable them to get rid of mathematical anxiety. Creativity in mathematics for students with ID has been covered in a small number of papers. The reason for this can be found in the fact that most authors associate creativity with the degree of intelligence. Susan Sperry Smith states in her conception of mathematics that teaching should not be based on memorizing facts but on creative activities, planning and discussion. The author believes that the support and patience of

teachers can develop a positive mathematical experience of children with ID (Sperry & Smith, 2001). A group of authors points out strategies for teaching mathematical skills in inclusive education: to connect mathematics with life situations (restaurant menu for learning addition); application of specific teaching aids, encouragement of drawing in solving textual tasks, working in pairs with students of the typical population as well as designing their own textual tasks (Furner, Yahya & Duffy, 2005).

4. Conclusion

In the concluding remarks, we emphasize the success in mathematics in relation to creativity. Of importance is the creativity of the teacher, the use of techniques to increase the creativity of students, which reflects the success of teachers. Different learning of children requires respect for the individualization of teaching. Aggravating factors are poor material equipment, many students in the classroom, expensive modern resources, teachers who are not trained to use them, too extensive curriculum, not adapted to students with disabilities. Despite that, teachers contribute to the creativity of students through work and economy. Instead of the classical conclusion, future research should examine the strategies used in mathematical creativity with developmental disabilities and typical populations, but also other factors of creativity in regular and inclusive teaching.

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