



Jasmina V. Milinković¹, Marija M. Vorkapić
University of Belgrade, Teacher Education Faculty,
Belgrade, Serbia

**Original
research paper**

Paper received: Nov 30 2020
Paper accepted: May 20 2021
Article Published: Oct 29 2021

Pre-Service Preschool Teachers' Attitudes towards Integrative Approach to the Development of Mathematical Thinking

Extended summary

The study deals with the integrated approach to early mathematics teaching. The integrated approach is based on a holistic view of the world of a child. It enables the development of a complex, holistic view of the world in children. The result of this approach is that children become perceptive of connections and relations when studying phenomena or in the process of solving problems (Vilotijević, 1998). The basic principles of the preschool curriculum in Serbia are the orientation towards preschool children getting to know themselves and the world around them, developing different relationships, and gaining experiences and knowledge about themselves and other people through social interaction with adults and peers. According to this perspective, the period of preschool education should ensure a comprehensive development of the child, encourage their abilities, expand experiences, and build a scope of knowledge (General Basics of Preschool Curriculum, 2006). The integrative approach is one of the key determinants of the new concept of preschool education described in the document “Years of Ascent”. This approach to learning in the program implies the interconnectedness of the process of development and learning, where learning is aimed at “perceiving the big picture” instead of acquiring “fragments of knowledge”, in which elements of all domains are meaningfully connected as a whole (Pavlović Breneselović & Krnjaja, 2017). Initial mathematical cognition in preschool children is not isolated, but it is a part of the general cognitive processes. For the accomplishment of the basic goals, early mathematics teaching relies on other educational domains (science, arts, language, and others). Preschool mathematics is dominantly organized through play as a spontaneous developmental phenomenon and a form

¹ jasmina.milinkovic@ufbg.ac.rs

Copyright © 2021 by the authors, licensee Teacher Education Faculty University of Belgrade, SERBIA.

This is an open access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0) (<https://creativecommons.org/licenses/by/4.0/>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original paper is accurately cited.

of processing and appropriation of experience in a symbolic way, but also through demonstration, association, and conversation (Čebić, 2009, Šimić, 1998). One of the basic qualities of the integrated approach is the intertwining of the content and procedures of different disciplines to achieve their deeper understanding and connection of knowledge from different fields, which, according to proponents of integrated mathematics, contributes to a better reflection of its nature (Milinković, 2011; Hardy, 2005). We consider the integration of mathematics on two levels: 1. integration of mathematical content from different domains of mathematics, in which all contents are evenly represented, 2. integration of contents from related areas of development, in which the contents of mathematics is dominant, and the others serve as an illustration, i.e., interdisciplinary integration of mathematics with other areas.

The main goal of the study was to examine students' perception of what specific mathematical contents are suitable for integrative learning. The study included 79 prospective preschool teachers enrolled at the Teacher Education Faculty program who had already completed the entire cycle of theoretical and practical training and were engaged in the final methodological practice. Descriptive statistical analysis was used to evaluate students' attitudes about the integration of mathematical content in activities. Students filled up an online questionnaire with open-ended questions. We report the results related to four questions: 1. Which mathematical content did you easily integrate with other areas? 2. For which mathematical content did you not find a way to integrate them? 3. What are the basic benefits of integrated activities? 4. What are the basic difficulties in the development of mathematical competencies through integrated activities?

The analysis shows that most students believe that there are no mathematical contents that are not suitable for integration. The concept of set was recognized as the most suitable for integration with the concepts of number, spatial relations, and measurement while the concept of number was linked to geometry. Participants recognize some of the advantages of integrated activities such as "holistic child development" and "natural process of learning". When it comes to the shortcomings, they point out that in this way it is more difficult to develop an understanding of a mathematical concept due to a loss of focus", as well as that "it is more difficult to plan and organize this type of activity". They also point to the possibility of neglecting "the unknown or difficult math content" and the conflict of methodological principles of different areas of development.

Based on the test results, it is clear that future educators are aware of the benefits of integrated learning from the child's position, as well as that the holistic view of the world in children is strengthened by this approach and through it the development of children's competencies in different areas of development. Future preschool teachers are also aware that it is not easy to plan integrated activities in a way that will fulfill the methodological principles of the development of initial mathematical concepts.

Keywords: integrative approach, preschool mathematics, intradisciplinary integration, interdisciplinary integration

References

- Bautista A., Ng, S-C., Múñez, D. & Bull, R. (2016). Learning areas for holistic education: kindergarten teachers' curriculum priorities, professional development needs, and beliefs. *International Journal of Child Care & Education Policy*, 10 (1), 1–18. DOI: 10.1186/s40723-016-0024-4
- Clements, D. H. & Sarama, J. (2009). Building blocks and cognitive Building Blocks: Playing to know World Mathematically. *American Journal of Play*, 1 (3), 313–337.
- Clements, D. H. & Sarama, J. (2013). Math in the Early years (Esc Research Brief: The Progress of Education Reform). *Education Comission of the States*, 14 (5), 1–7.
- Ćebić, M. (2009). *Početno matematičko obrazovanje predškolske dece*. Beograd: Učiteljski fakultet.
- Dejić, M. (2013). *Metodika razvoja početnih matematičkih pojmova*. Beograd: Učiteljski fakultet.
- Hardy (2003). Can integrated instruction really lead to 'Karate Kid learning'. *For the learning of mathematics*, 26 (2), 17–21.
- House, P. A. (2003). Integrated mathematics: An Introduction. In: McGraw, S. A. (Ed.). *Integrated Mathematics Choices and Challenges* (3–11). Reston, Virginia: The National Council of Teachers of Mathematics.
- Kamenov, E. (1987). *Predškolska pedagogija*. Beograd: Zavod za udžbenike i nastavna sredstva.
- Lee, J. S. & Ginsburg, H. P. (2009). Early childhood teachers' misconceptions about mathematics education for young children in the United States. *Australasian Journal of Early Childhood*, 34 (4), 37–45.
- Mac Naughton, G. (2003). *Shaping Early Childhood Learners, Curriculum and Contexts*. Berkshire: Open University Press.
- Malinović-Jovanović, N. & Ristić, M. (2018). Possible models of integration of preschool mathematics and physical education. *Facta Universitatis Series: Physical Education and Sport*, 16, 595–610.
- Milinković, J. (2011). Elementi integrativnog pristupa u udžbenicima. *Inovacije u nastavi*, 24 (1), 53–63.
- Mišćević Kadrijević, G. Mandić, D. & Bojanić, J. (2019). Preschool Teachers' Assessment of the Integrative Approach to Environmental Education. *Teaching Inovations*, 32 (3), 90–99. DOI: 10.5937/inovacije1903090M
- Nesin, G. & Lounsbury, J. (2019). Curriculum Integration: Twenty Questions-With Answers, *Becoming: Journal of the Georgia Middle School Association*, 30 (1), Art. 3. DOI: 10.20429/becoming.2019.300103
- *Opšte osnove predškolskog programa* (2006). Službeni glasnik RS – Prosvetni glasnik, 14.
- *Osnove programa predškolskog vaspitanja i obrazovanja* (2018). Službeni glasnik RS – Prosvetni glasnik, 16.

-
- Pavlović Breneselović, D., Krnjaja, Ž. (2017). *Kaleidoskop: Osnove diversifikovanih programa predškolskog vaspitanja i obrazovanja*. Beograd: Institut za pedagogiju i andragogiju.
 - Piaget, J. & Inhelder, B. (1978). *Intelektualni razvoj deteta*. Beograd: Zavod za udžbenike i nastavna sredstva.
 - Šimić, G. (1998). *Metodika razvijanja matematičkih pojmova*. Šabac: Viša škola za obrazovanje vaspitača u Šapcu.
 - Vilotijević, N. (1998). Sistemsko-teorijske osnove integrativnih nastava. *Metodička praksa*, 4, 79–96.
 - Vilotijević, M., Vilotijević, N. (2008). *Inovacije u nastavi*. Vranje: Učiteljski fakultet.
 - Vygotski, L. S. (1978). *Mind in society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.
 - Usiskin, Z. (2003). The Integration of the School Mathematics Curriculum in the United States: History and Meaning. In: McGraw, S. A. (Ed.). *Integrated Mathematics: Choices and Challenges* (13–31). Reston, Virginia: The National Council of Teachers of Mathematics.