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Child: “I don’t Understand – We didn’t Learn that in Kindergarten!”

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Abstract

By the end of 2022, Serbia transformed its preschool education system, transitioning from a traditional approach to a project-based learning approach. However, if this transformation remains limited to preschool education without coordinated changes in learning at lower (and even higher) grades of elementary school in the next 4–8 year cycle, teachers, children, and their parents will be most affected.

We believe that the new project-based approach to learning for children will not provide adequate fundamental and systematic knowledge in many scientific fields, including mathematics methodology (e.g., spatial and temporal relationships, arithmetic, number concept, ratios, fractions, geometry...).

The consequences will not only be visible in their further education but also in their inadequate preparation to navigate their environment and understand space, time, relationships, and other mathematical concepts. This is what the educators' survey results are talking.

The aim of this paper is to highlight possible problems since the Government of the Republic of Serbia and the Ministry of Education have not suggested a linear reform of these education levels.

Keywords: traditional approach to learning, project-based approach to learning, systematic adoption of mathematical concepts, inability to cope with the environment, harmonization of preschool and elementary school educational programs

Introduction. The Preschool System of Serbia has Transitioned from Traditional Teaching to a Project-Based Learning Approach

In late 2022, Serbia transitioned its preschool education system from a traditional approach to a project-based learning (PBL) approach.

Until then, in most state and private institutions, the content of work included the following areas: mathematics, speech culture, physical education,

music culture, and visual arts education (i.e., methodology for these areas such as the methodology for developing initial mathematical concepts), as part of the curriculum and activities that were aimed at developing different aspects of a child's development (Hilčenko, 2022a, 2022b).

This form or methodology of work was not mandatory for all institutions, and other methodologies were also represented alongside this curriculum, including:

- *the Montessori methodology*, which involves working with natural materials, developing motor skills, encouraging independence and individuality in children,

- *the Pikler methodology*, which focuses on developing independence, guiding a child's interests, nurturing creativity, attention, empathy, and respect,

- *the Reggio Emilia methodology*, which focuses on creating an environment that encourages curiosity, exploration, experimentation, exploration of art, and creativity,

- *the Vygotsky methodology*, which focuses on supporting children's social and cognitive development through interaction with peers and adults, and

- *the High/Scope methodology*, which involves structuring the educational process around experiential learning, planning activities in which learning occurs, with the support of educators in acquiring knowledge and skills.

These less prevalent methodologies also included these areas in their programs and approaches, but primarily focused on the overall development of the child, rather than just one or more areas.

PBL is based on the idea that children learn through activities that are aimed at solving real problems, exploring and discovering new things, and creative expression (Gaftandzhieva, Hussain, Hilčenko, Doneva, 2023). **PBL** involves children participating in group projects, which develops their collaboration, communication, and teamwork. Children are encouraged to develop their ideas, experiment, make decisions, work together, and find solutions to the problems that are presented (Hilčenko, 2019).

This approach focuses on the learning process (Hilčenko, 2015c), not just the results. Children are encouraged to actively participate in the entire process, which contributes to their emotional, social, and cognitive development. Through **PBL**, children learn about different topics such as ecology, nature, art, history, and society. It encourages the development of critical thinking, exploration, creativity, and self-confidence in children (Hilčenko, 2015b).

It is important to note that **PBL** does not replace traditional learning methods, but complements them. **This means that children still learn basic skills such as reading, writing, and math, but in an interactive way that is tailored to their age and interests** (Hilčenko, 2006).

As before and now, **PBL** was not mandatory for all preschool institutions, primarily not for those in the private sector.

“PRO ET CONTRA?” – “FOR and AGAINST?”

In some aspects, **PBL** in kindergarten is considered more effective than traditional approaches. **PBL** supports an individual approach, emphasizes exploration and experience, helps children to acquire independence and the ability to think creatively, and also encourages them to engage with topics that interest them (Hilčenko, 2015c). “However, **traditional approaches are often used because of their simplicity and adaptability, and they can also “provide structure” and order in the environment for children**” (Hilčenko, 2009, 2008).

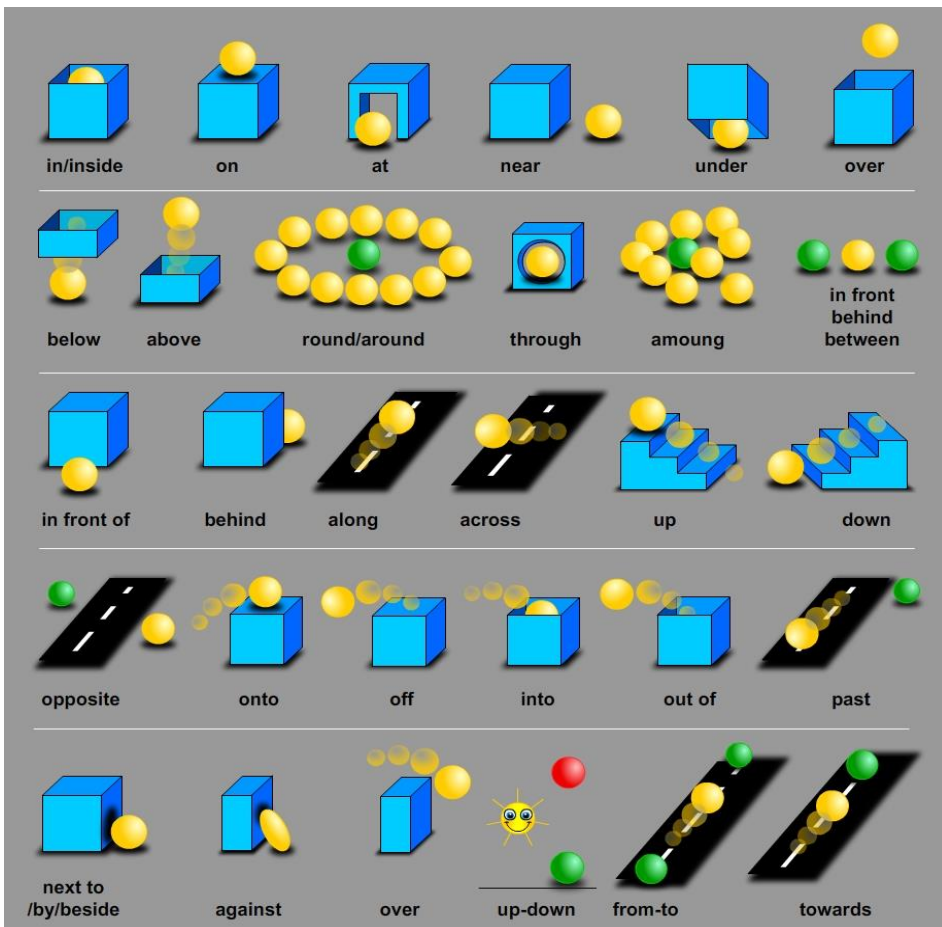


Figure 1

We believe that **PBL** may not provide children with sufficient knowledge from “old” teaching methods. The question arises, what consequences could there be for the mental and physical development of a child if mathematical concepts such as spatial relations (Figure 1), temporal relations, natural numbers, place value in number sequences, greater-than and less-than relationships, fractions (whole, half, quarter, etc.), addition, subtraction, object classification and serialization, set theory, geometric shapes and figures, developing the concept of mass, length measurement, time perception, time relations, interval operations, and developing knowledge of material values and money as a measure of value are inadequately and unsystematically taught through a new program in kindergarten?

Some possible examples of consequences that children may experience due to a lack of adequate mathematics training are:

1. Difficulty in understanding and applying basic mathematical operations such as addition, subtraction, multiplication, and division.

2. Lack of understanding of basic mathematical concepts such as fractions, decimals, percentages, ratios, and proportions.

3. Difficulty in solving problems that require the application of mathematical concepts and skills.

4. Lack of understanding of geometric concepts such as shapes, sizes, space, and time.

5. Problems in estimating, measuring, and quantifying real-life situations such as grocery shopping, scheduling, and the like.

6. Limitations in developing critical thinking, logical reasoning, and problem-solving skills that are essential for success in further education and life.

7. All of these consequences can have a long-term impact on a child’s ability to cope with the demands of modern society and achieve success in their professional and personal life.

We have verified these assumptions through a survey of a larger sample of educators (#60) who are already implementing the new program. Based on the summary of survey results, we highlight the dominant attitudes:

ON QUESTIONS: *“Since the new preschool program does not systematically teach children mathematical concepts covered by the previous traditional curriculum, could this have negative consequences on the child’s mental and physical development?”*

Educators believe that in terms of:

- *the lack of systematic and structured learning of mathematical concepts could affect the development of cognitive skills, including reasoning, problem-solving, logic, and abstract thinking,*

- *the lack of learning mathematical concepts could affect later success in school subjects that require mathematical skills,*
- *the lack of development of mathematical concepts could have a negative impact on the development of motor skills, as many mathematical skills, such as object classification and seriation, are based on visual perception and fine motor skills.*
- *also, the (mis)understanding of basic mathematical concepts, such as measurement and counting, is important for everyday activities, such as cooking and shopping.*

According to the new work program in preschool institutions, higher education institutions in Serbia that educate educators have conducted necessary re-accreditations of their old work programs for this educational profile, in which they have retained traditional teaching methodologies. The reasons for doing so are in line with the attitudes of the surveyed educators.

What does this mean in practice?

As part of the **PBL**, children themselves choose the topics of future projects based on their interests or desires, and it is up to educators to independently assess whether or not to include some content from traditional teaching methodologies that would “supplement” children’s knowledge on the chosen project topic.

For example, if the project topic is “**Dinosaurs**”, the educator decides whether to implement certain knowledge, and to what extent. This means that from project to project, the educator may or may not implement certain partial knowledge from a methodology, rather than a systematic approach.

Furthermore, we asked educators: *“Can the non-systematic acquisition of mathematical concepts, spatial and other relations, such as time, length, weight, mass, and similar relationships, have an impact on a child’s ability to navigate in their environment and life situations, that is, space and understanding of it, if the child has not been put in situations to practice these concepts during their acquisition?”*

We have systematized all the answers into the four most prevalent opinions:

- *“Systematic non-adoption of mathematical concepts, spatial and other relations in early childhood in kindergarten can affect the child’s ability to navigate the environment and understand space and similar relations later in life.”*
- *“Lack of understanding of these concepts can affect the child’s ability to navigate the environment and understand different situations involving space and similar relations” (Hilčenko, 2017).*

– *“If the child is not exposed to different situations in which these concepts are applied and if they have not learned and practiced these concepts systematically, this can lead to difficulties in understanding spatial and other similar relations. For example, the child may have difficulties understanding directions, orientation, distance, and similar concepts that are important for navigation in space.”*

– *“It is important for the kindergarten program to include systematic development of mathematical concepts and spatial relations to ensure optimal development of cognitive and motor skills in children, which will later help them navigate the environment and understand space and similar relations.”*

Conclusion

Translated to English: The last question directed to the preschool teachers was to express their opinion on which of the two programs is better. We have summarized the most common opinions in the following manner:

– *“It is difficult to give an absolute answer to the question of which approach is better because it depends on many factors, including the goals of the preschool, the needs of the children, available resources, and other factors.”*

– *“Each of these two approaches has its advantages and disadvantages, meaning that it places more emphasis on promoting certain abilities in children.”*

– *“Although the **PBL**, which encourages independence, initiative, and creativity in children, can be useful in developing their abilities and creating a positive learning environment, there is a big question about what knowledge children will take to primary school in the areas of mathematics, language and culture, environment, physical education, and music?”*

– *“The optimal combination of different approaches can provide the best experience for children in preschools.”*

As it is currently impossible to assess the effects of **PBL** because the first generation of these children is still in preschool and their readiness for primary school is unknown, we will have to wait and see. Whether there will be an alignment of curricula with those in primary schools and the smooth continuation of the education of these children, time will tell so that the problems we have discussed will not arise.

Until then, let's look at this problem from a brighter perspective. Here are a few examples:



"I told her to eat half of the grapes I gave her!" – RELATING TO SIZE



"I explained to her how to make a snow angel. Apparently, I forgot to mention an important 'detail' – THE SPATIAL RELATION 'ON'"



*"I told the child that they can serve the guests cake 'in my shoes.'" –
Spatial relation "IN"*



"She told me she learned the concept of classification ... but she practiced that topic on the wrong material" – CLASSIFICATION

Figures 2–5. Some possible misunderstandings in real life

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