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Realization problems in the Individualized Educational Plan of physics teaching in elementary schools in Serbia

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Abstract. An Individualized Education Plan (IEP) is a specific document, which provides the opportunity for the pupils with development disorders, disabilities, and children from the sensitive groups, regardless of their material status, to have the access to all levels of education. Preparation and implementation of IEPs in physics teaching for elementary schools are done on the basis of a unique curriculum for physics in Serbia. Using this unique curriculum as a guideline, the inclusive education team has the task of developing an IEP for each student who needs it. Physics provides great opportunities for the development of functional and applied knowledge for students with special needs. The development of an IEP is a very important and delicate task for teachers, which is why it is necessary for them to constantly improve in this area. Physics teachers have problems in the preparation and implementation of IEPs. The aim of this paper is to research and systematize these problems in order to contribute to overcoming them. For that purpose, research was done on the application of IEP in some elementary schools. Problems are systematized into three groups: problems in preparing classes for work with students on IEP; problems in the organization of working with those students during the physics class; sources of materials used by physics teachers to prepare IEP classes. The research results show the following percentage of answers: the biggest problem is the lack of literature for teaching preparation (64%), then adjusting the way of teaching to the needs of students working on IEP (52%) and adjusting the content of subjects (46%). Surprisingly, not many teachers point out the lack of time and standard tests to check student achievement as a problem. Most teachers have a problem with the organization of work with students according to the IEP during physics classes (68%), while a smaller number of teachers have a problem with the interaction with students (14%). The existence of more than two students per IEP in the class was a problem for 40% of teachers, while 48% of teachers point out filling out documentation and writing a personalized plan as problem. Physics teachers need seminars that provide specific information about working with students on IEP, as well as the presence of a pedagogical assistant in class.

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1. Introduction

Inclusion was defined by UNESCO at the conference in Salamanca in 1994: "Inclusion is the process of solving and responding to the diversity of the needs of all students through increasing participation in learning, cultures and communities and decreasing exclusion within and from education. It includes changes and modifications in content, approaches, structures and strategies, with a shared vision that includes all children of an appropriate age and with the conviction that the regular education system is responsible for the education of all children" [1].

Inclusive education was introduced in Serbian schools by legislation in 2009. [2]. Since then, teachers have been trying to adapt their teaching methods and styles to different groups of children, constantly improving themselves. They have to overcome their prejudices and adapt their way of working to achieve success with each student.

Inclusive education can be such that all children are educated in regular educational institutions, regardless of origin, degree of developmental disabilities or learning difficulties. This is called the one-track approach and is practiced in Spain, Greece, Italy, Portugal, Sweden, Norway, Iceland and Cyprus (Brusling & Pepin, 2003). Other countries (Denmark, France, Ireland, Luxembourg, Austria, Finland, Great Britain, Latvia, Liechtenstein, Czech Republic, Estonia, Lithuania, Poland, Slovakia and Slovenia) apply a multi-track approach, i.e. linking regular and special education into one system (Brusling & Pepin, 2003) [1].

Serbia applies a multi-track approach and in recent years has invested large amounts of money in reforming regular and special schools. The reform is based on equal rights for all and access to education for all. The adopted laws oblige all employees in education to respect inclusive principles, implement inclusion in practice and regulations and provide assistance to anyone who needs it [1].

1.1 Procedure for adoption of IEP

The teacher monitors the development and learning process of each student through the following areas: study skills, social and communication skills, independence and self-care. If, during the monitoring process, the teacher recognizes that there are physical, communication or social obstacles among students that adversely affect the well-being and development of students and the expected outcomes of education and upbringing, data collection begins in order to create documentation for the purpose of providing appropriate support in education and upbringing. The teacher also collects data from different sources: from parents, experts outside the educational institution who know the student well, from peers and the student himself, using different instruments and techniques. Medical findings are, if necessary, an integral part of the documentation [2].

On the basis of these collected data, the professional associate, together with the teacher and the parent, compiles a pedagogical profile of the student. The pedagogical profile contains a description of the student's educational situation and highlights the student's strengths and weaknesses. It is the basis for planning strategies for an individualized way of working with students [2]. Based on it, the areas in which the student needs additional support are determined.

In the area of learning skills, the physics teacher collects and evaluates information on whether there are areas in which the student shows below or above average achievement, whether his progress is slower than his peers, and whether his needs differ from his peers (for example, he cannot perform laboratory tests exercises due to physical damage or whether, despite supplementary work, he cannot adopt the basic level of achievement or fulfill at least some outcomes prescribed for the corresponding class). Here, it is also taken into account whether the student understands the read text, whether he has a developed arithmetic thinking, i.e. can he write appropriate definitions and physical laws with symbols and mathematical notation, is he motivated to learn physics, and if the student has disabilities, do they affect his achievements, e.g. whether his acoustics are not at a satisfactory level due to his hearing impairment [1].

In the area of social skills, the teacher collects information on whether the student respects the basic rules of behavior in the classroom and the laboratory, as well as towards peers and older people, whether the student can adapt to different situations, whether he has specific reactions that need attention (e.g. autistic people often react violently to sudden changes in classroom routines) and conversational skills, e.g. whether he needs more time to solve a task, answer a question or perform an experiment [1].

The collection of information in the field of communication skills is limited to the existence of disabilities related to hearing, vision, speech or other forms of communication (e.g. the absence of an internet connection and a computer or mobile phone during distance learning) and how this affects his achievements and whether the language in which communication is carried out is his mother tongue or he has difficulties with it.

In the area related to independence and self-care, it is observed whether the student has obstacles related to independent movement and the performance of daily duties and how they affect his achievements (e.g. he cannot independently perform experiments and laboratory exercises due to cerebral palsy) and whether the student has any health problems [1].

The last area within the pedagogical profile represents the influence of the external environment on learning, that is, the influence of family, peers and the environment on the child's ability to learn. In relation to these areas, the teacher and professional associate plan individualization measures.

Individualization measures include: "1) adjusting the space (by removing physical barriers) and the conditions in which teaching takes place (creating a special schedule, etc.); 2) adaptation of work methods, teaching aids and didactic material, methods of giving instructions and assigning tasks, monitoring progress, methods of acquiring content, checking knowledge, organization of learning situations, setting rules of behavior and communication, etc. 3) changing the content of activities in the educational group, that is, the content of learning and the outcome of education and upbringing." [2].

If the individualization measures do not contribute to the improvement of the student's achievements, the teacher and professional associate propose the adoption of IEP 1. The school team for inclusive education, after accepting the proposal of the IEP, proposes to the school director a team for providing additional support to the student, which he appoints and consists of a physics teacher, a professional associate, a parent, and, if necessary, a pedagogical assistant. That team then approaches the development of the IEP, for which the parent gives consent [3].

This is followed by the application and finally the evaluation of IEP 1. If no progress is achieved even with the application of IEP 1, then with the consent of the parents, the opinion of the interdepartmental commission for assessing the need for additional educational, health and social support is obtained. After the positive response of the commission, IOP 2 is adopted.

In practice, physics teachers encounter a large number of different problems in the preparation and implementation of the IEPs. The aim of this paper is to research and systematize these problems in order to contribute to overcoming them.

2. Research Methodology

The subject of research in this paper is: examine the degree of expression of the basic variables (teaching area, help in working with children according to IEP and difficulties in working with children according to IEP) in the sample physics teacher; examine whether there is a connection in the degree of expression of the basic variables in relation to the experience in working with the IEP and years of work as a physics teacher [4].

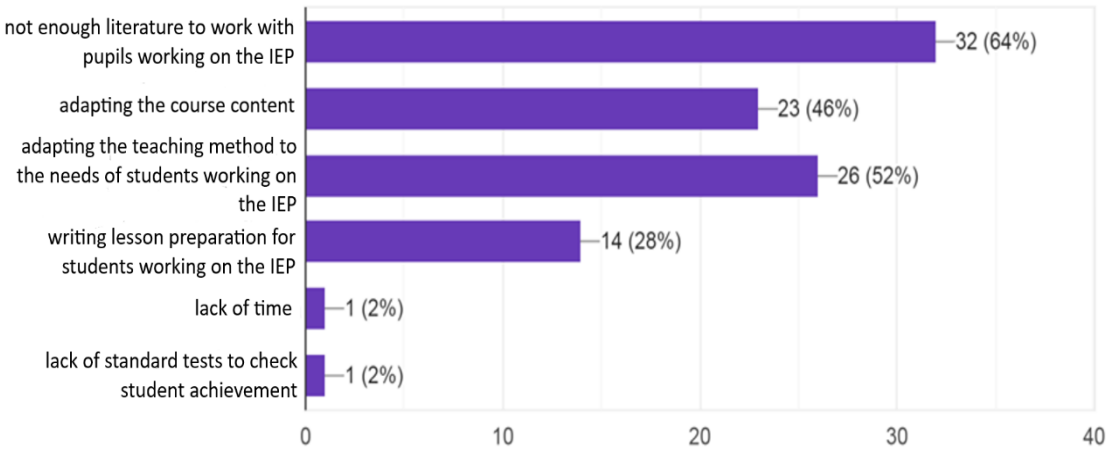
The theoretical importance of the research is an increase in knowledge about the degree to which physics teachers have difficulties working with students according to IEP and an insight into areas that present difficulties. The practical importance of this research is the potential help in building a more efficient school system in the domain of teachers' work with students with special needs, overcoming recognized difficulties.

The research technique that was applied is surveying. It was created for this purpose questionnaire for physics teachers who have experience in working with students according to IEP. The questionnaire was created on the basis of a test questionnaire that was administered once in the first phase to a small number of respondents. The questionnaire contained 26 questions. The first 3 questions were multiple choice questions and related to the most common difficulties they faced physics teachers met while working with children, students according to IEP and sources the materials they used for the lessons. In the following 6 questions, the teachers should have answers which areas of physics by grade were the most difficult and easiest to work with students according to IEP. The next 10 questions were about the extent to which physics teachers received help when working with students according to the IEP, but also with which they encountered difficulties. At the end of the questionnaire, due to the current situation due to the outbreak of the Covid-19 epidemic, due to which a new way of working with students was introduced, distance learning, questions are given that should give answers as to how successful they are teachers adapted the work according to the IEP to distance learning. The teachers were supposed to answer how successfully certain teaching units were transferred to students according to IEP.

The sample consisted of a total of 50 respondents from primary and secondary schools in Serbia. All of them were physics teachers in primary schools at least once. The respondents differed in gender, age, length of service and number of students with whom they taught according to the IEP. Most of the teachers were over 41 years old, 64% of them. Only 12% of physics teachers are under 30 years old.

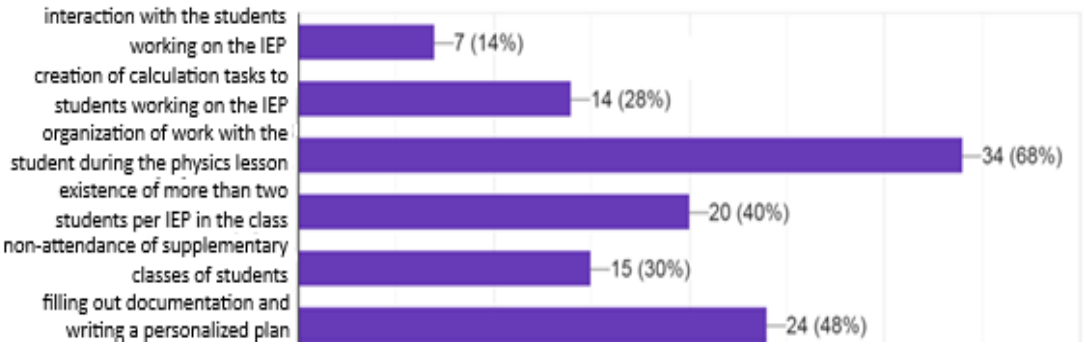
3. Results and Discussion

Results on graph 1 show the percentage of responses related to difficulties in preparing lessons/lectures in classes with students working to IEP. The most common difficulties faced by teachers were that there is not enough literature to work with (64%) and adapting the teaching method to the needs of students working on the IEP (52%), while only 23 teachers mentioned adapting the course content. It is surprising how few teachers cite lack of time as a problem.



Graph 1. The most common difficulties in preparing lessons/lectures in classes with students working on IEP [4]

Graph 2 shows the results of research related to the most common difficulties that physics teachers encounter when working with students working on IEP. Most of the teachers had a problem with the organization of work with the student working on the IEP during the physics lesson, while a smaller number of teachers have a problem in the very interaction with the students with whom they work on the IEP. There is a high percentage of students who do not come to supplementary classes, as much as 30%, which requires better cooperation with parents, class teachers and the psychological-pedagogical service. The existence of more than two students per IEP in the class was a problem for 20 teachers, while 24 teachers singled out filling out documentation and writing a personalized plan as something that creates difficulties.



Graph 2. The most common difficulties in working with students working on IEP [4]

When it comes to the material that physics teachers use for lesson preparation in classes where they work with children according to the IEP, the largest number of teachers use standard

textbooks or content found on the Internet and then adapts them to the teaching according to the IEP [5]. A number of teachers design their own questions and tasks for students working according to IEP.

In questions related to the help that teachers receive for the needs of more effective work with children working on the IEP, the results shown in Table 1 were obtained. It was shown that the presence of a pedagogical associate during the lesson would be of great importance (average score 4.04 on the scale from 1 to 5). The teachers rated the support from the pedagogical services in their schools very poorly. They are dissatisfied with the instructions and support from the publisher (average rating 1.46 on a scale of 1 to 4). Physics teachers perceive lack of time as one of the factors that make it difficult for them to work with children working on the IEP, which is in contradiction with the previously given answers to the first question. It can also be seen that adapting calculation tasks to students according to IEP is not practiced.

The biggest problem physics teachers face is the insufficient support provided by professional associates and textbook publishers. As far as the author of this paper knows, in Serbia there is only one textbook for each grade of elementary school for working with children working on the IEP, published by Alka Script, and one publishing house provides its users with a manual of teaching sheets for working with children working on the IEP. Other publishers provide reference manuals for working with children with disabilities. In general, teachers are poorly informed even about these possibilities, but it is necessary to demand from publishing houses to dedicate more time and effort in creating materials that would help physics teachers to work with children working on IEP.

It is obvious that physics teachers do not do well when working with children working on the IEP and that they need help, but due to the lack of professional associates in schools, this is probably the reason for such a negative response from teachers.

By comparing Table 1 and Graph 2, we see that the problem for teachers is the lack of time during class to devote to students working on IEP, which may be due to insufficient organization of work. We can see from Graph 1 that it is a big problem for teachers to adapt the content and way of working, as well as the creation of a lesson plan with students working on the IEP. All this causes problems that teachers have with the organization of class time with children who are working on the IEP. In most cases, teachers do not assign calculation tasks to students working on the IEP. Students should be given calculation tasks, but at the same time they should be adapted to each student so that he can do them.

The teachers rated the help they received at the seminars with an average score of 2.22. However, the general impression is that physics teachers need seminars that provide concrete information when working with children working on IEP, especially in the field of physics, considering that most of the seminars are of a general type.

To a large extent, teachers stated that the presence of a pedagogical assistant would greatly benefit them during the course of the lesson. That way, they wouldn't have to worry about whether they devoted enough time and whether the other students were deprived of knowledge in physics.

Performing demonstration experiments and laboratory exercises did not help or hinder physics teachers when working with students working on the IEP. Creating a personalized plan

for physics teachers was not a big problem. Cooperation with other students is rated quite well by physics teachers in classes with students working on IEP.

Table 1. Arithmetic mean and range of values for items that helped or did not help them in working with pupils working on the IEP [4]

	number of participants	minimum	maximum	Arithmetic mean	Standard deviation
assistance from professional associates	50	1	3	1.92	0.724
constant presence of a pedagogical associate	50	1	5	4.04	1.009
using demonstration trials	50	1	3	2.38	0.635
help from physics textbook publishers	50	1	4	1.46	0.676
adjustment of calculation tasks	50	0	3	1.54	1.460
cooperation with other students	50	0	5	3.42	0.992
creation of a personalized work plan	42	1	5	3.19	1.254
devoting enough time during class to students working on IEP	50	1	3	1.64	0.663
help at seminars	50	0	5	2.22	1.375
performance of laboratory exercises	50	1	3	2.26	0.694
Valid respondents	42				

4. Conclusion

Physics, as a subject, provides great opportunities for the development of functional and applied knowledge of students with special needs. Creating an individual educational plan is a very important and delicate task for teachers. The paper presents the results of research related to problems in the preparation and implementation of IEP in physics teaching in some primary schools. Problems are systematized into three groups: problems in preparing classes for work with

students on IEP; problems in the organization of working with those students during the physics class; sources of materials used by physics teachers to prepare IEP classes.

The research results show that the biggest problem is the lack of literature for teaching preparation (64% of teachers), then adjusting the way of teaching to the needs of students working on IEP (52%) and adjusting the content of subjects (46%). Most teachers have a problem with the organization of work with students according to the IEP during physics classes (68%), while a smaller number of teachers have a problem with the interaction with students (14%). The existence of more than two students per IEP in the class was a problem for 40% of teachers, while 48% of teachers point out filling out documentation and writing a personalized plan as problem. Physics teachers need seminars that provide specific information about working with students on IEP, as well as the presence of a pedagogical assistant in class.

In order to overcome these problems, it is necessary to enable continuous professional development of physics teachers, as well as strong support from schools, professional pedagogical and psychological services, the Ministry of Education, Science and Technological Development of the Republic of Serbia and society as a whole.

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