

TESTING THE PRESENCE OF INCLUSIVE EDUCATION OF MATHEMATICS IN PRIMARY SCHOOL

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Abstract

This research were related to testing the presence of inclusive teaching of mathematics in primary schools, where students with special needs and talented work by individual approach and individual curriculum. We investigated the attitudes of teachers and parents in order to contribute and achieve the potential students' progress in adopting mathematics with students who have specific problems and work with talented students in the classroom.

Assuming that in the teaching process in primary schools the Canton of Sarajevo has implemented improvement to current changes, and that, as a result of realized seminars and training teachers, has a form of implementation of inclusive teaching of mathematics in primary school and individualized approaches and individual programs, the aim of this the work is:

To encourage acceptance of individual assessment and individual planning in mathematics as a process of observation, monitoring, analyzing, evaluating and improving the quality of the adoption of mathematical knowledge in elementary schools (level of adoption).

Key words: research, students, individualized and individual approach, teachers, parents, mathematical content

Introduction

The reform of the educational system in Bosnia and Herzegovina and the process Involvement of children with special needs in regular schools, individualization is recognized as a principle that becomes more significant for these children, but also talented. Students with special needs can progress (in all or in some activities), as their peers, espe-

cially in inclusive teaching of mathematics, with specific adaptation of curricula, but should not have students who can not bring up and educate in accordance with his opportunities. Special activities for talented students in mathematics teacher should plan and work regularly with these students to help them focus and prepare for the future.

Efficiency overcome traditional teaching and improving the educational system significantly depend on the readiness of teachers to accept and support the changes that his offer or simply by himself introduces in the educational work.

This paper presents an inclusive approach to teaching of mathematics from the perspective of teachers and parents on student achievement.

1. Theoretical approach to the problem

1.1. Inclusive teaching of mathematics

Inclusive teaching of mathematics in primary schools leads children in math, teaches them to apply mathematics in everyday life and determines its position in basic education. The educational system needs to observe from the point of application of various methodological model of organization of the teaching process, "particularly in the methodology of teaching mathematics because the role of mathematics is very important in modern life" (Arslanagić, 2009). Determination of individual needs in mathematics means overview at the behavior of students in the application of mathematics in all its segments, and because of detection the motivation of their opportunities (Both, T., Aincow, M., 2008).

"Assessing the skills, knowledge, interests and needs of students with special needs base is for determine further work of teachers in relation to

the planning and implementation of adjustment in the educational process, in all its stages“ (Shapiro, 2005). From this evaluation will depend on whether the student work at an individualized approach or will have a special IAP (individualized) plan of adoption of mathematics.

1.2. The role of teacher

The role of teacher in inclusive classrooms is important and specific, because the teacher on the first day watching the children. “The main goal observation - observation is collecting information for an initial assessment” (Veljkovic, 2003), which will help the teacher and team for making IAP - individually adapted programs to do and realize IAP in mathematics. The teacher can implement the evaluation in several ways, using different methods of recording. “The most natural, common methods of observation of children using in a game situation, work, learning and socializing in the natural environment” (Burke, 2002).

2. Methodological part of research

2.1. The problem of research

Inclusive education means activities of individuals and society as a process of learning and teaching which leads to permanent changes students in conditions of support and social inclusion. “This process should not understand only as a school, although it is focusing in a period of growing up on school effects” (Suzić, 2008, 11). Therefore, it should understand as primary education, but also as a spontaneously of learning and self-education. Inclusion in mathematics is the term of involvement in the adoption, exercise and work math “every” student, whatever his difficulty or visible progress. Here is investigating an inclusive approach in the mathematical content that is tailored to students’ abilities.

2.2. The Methods of Research

This research is descriptive, theoretical part of the work is processed by the method of study of reference literature and web pages with a combination of qualitative and quantitative content analysis. In relation to the level of knowing peda-

gogical fields basic methods of empirical part of this research are:

- descriptive
- empirical non-experimental (Survey)

The method study of reference literature implies the use of pedagogical - psychological literature, handbooks, curricula, professional and scientific papers in the field of inclusion, methods and case studies (case study - method of studying individual case). “Survey methods in educational research is one of several existing aspects of the research of pedagogical phenomena and to one whose starting point in empirical facts and data” (Hubby, 2002). In this paper presents research problems that can study optimally by direct observation and inference based on induction as the appropriate logical process. By this method we have used for testing the attitudes and opinions of teachers and parents about the importance of inclusion in primary school, access to students, individual and individualized approach, and of education in this area. The data processed in the program in Microsoft Office Excel 2010 and SPSS, version 20th.

2.3. The Goals of Research

- To analyze the connection of individualized approach, individual planning and implementation of plans and programs of inclusive teaching of mathematics, and the influence of adoption on the further development and attitude of students towards mathematics (students with special needs and talented students).
- Research attitudes of Teachers ‘nine-year education in primary schools who work inclusive teaching of mathematics (methods, forms, resources, assessment in mathematics) and their qualifications for the work of inclusive teaching of mathematics and individualized approach, as well as individual planning (depending on the number of seminars and all forms of professional training they have attended).
- Research attitude of the parents about cooperation with the school and the students’ progress in the work of mathematics (10 pupils with difficulties in the work of mathematics and 10 gifted students)
- Analysis of students’ works.

2.4. Hypothesis of the research

In accordance with the object and purpose of this study, the results of previous indirect research and practical experience, the general hypothesis of this paper is:

H_0 - There is a correlation qualifications of teachers for individualized approach, IAP planning of inclusive teaching of mathematics and mathematical knowledge acquired the effect on the further progress and attitude towards mathematics in general.

2.4.1. The other hypotheses are:

H_1 - Teachers who apply different methods, procedures, forms and means of work, and descriptive evaluation in the first two grades, achieve better progress in inclusive teaching of mathematics;

H_2 - Students who work at an individualized approach and individual curriculum achieve better results in the learning of the content of mathematics and they motivated to further work in mathematics, (students with special needs, difficulties and talented students);

H_3 - Teachers who have passed a number of professional training and education are better prepared for work of inclusive teaching of mathematics, individualized approach and individual planning;

H_4 - Parents who cooperate with teachers and school see their child's progress in the work of mathematics;

H_5 - Students' papers show the progress of students in inclusive teaching of mathematics.

2.5. The pattern of the research

Research has conducted in primary school "Aleksa Santic", and to the students of II, III, IV, V and VI of the class during the second semester, and in the first half of the next class: handicapped child, autism, elements of autism, cerebral palsy, dyslexia, dysgraphia, dyslaly, bradylalia and discrete hemiparesis left, reactive emotional disturbance in early childhood, epilepsy, mental retardation easier, difficulties in the work of mathematics - the level of adoption of mathematical content (using inclusive teaching of mathematics), talented students in mathematics IV grade - 10 students.

Examined the attitudes of teachers about inclusive teaching of mathematics and the use of different methods, procedures, forms of work, as andworking means, and individualized approach and development of the individual - IAP in mathematics.

A survey has done about advantages and disadvantages of cooperation of parents of children with special needs with teachers and school (teachers and parents).

A pattern of students is 10 students who divided into two research criteria that we respected while we processed the date: students working on individual IAP (2 students) and students who work at an individualized approach (8 students), and 10 talented students of mathematics. Teachers involved in the research are: teachers in the classroom who have children with special needs - with difficulties and talented students and other teachers who don't have the students (with special needs - with difficulties and talented students).

2.6. Techniques and instruments of the research

We have done the dates the procedure written survey of teachers and parents as non-directional observational procedure. Standardized questionnaire conceptualized as a series of indicators that build motivation for work examined the ability of teachers for inclusive education, individualized approach and making individual plans. The instrument for measuring attitudes is adequate measurement scale (teachers and parents). For the level of adoption of mathematical knowledge are the students' tests.

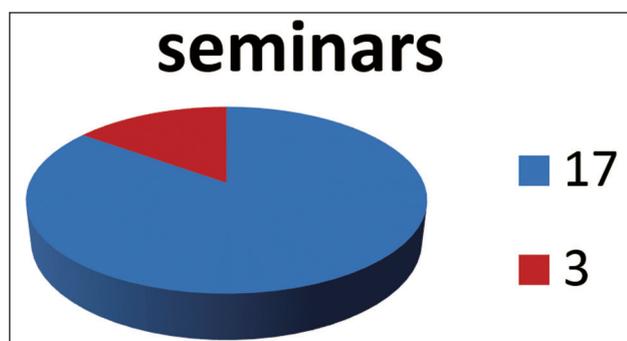
3. The results of the research

The importance of the research, as the results get in this study, relate primarily to educational theory and practice. Previous experience and research results show clearly that the effective modernization of inclusive teaching of mathematics, and realistic planning and programming of these activities can achieve "only if it has a sufficient amount of objective technical information on the basis of which it is possible to diagnose the current situation and to establish procedures for further work" (Pejić, 2004). Based on these results it is not difficult to conclude that the teaching of math-

ematics in primary school necessary to introduce changes in the approach to this subject within the meaning content planning, implementation and evaluation of the same, with the aim of facilitating and increasing the efficiency and quality of teachers, on the one hand, and students, on the other hand, “as provide individual progress of students in mathematics” (Markovac, 1970). The results showed that teachers informed enough with the sphere of monitoring, evaluation and assessment in mathematics, but requires a more flexible approach to teaching content and create their own tasks according to students’ abilities. This would facilitate the work of teachers, and would increase the motivation of students and parents.

3.1. The results of the research (teachers)

“**The presence of seminars**” - 17 teachers (85%) of primary school “Aleksa Santic” attended seminars for professional development of teachers. These are seminars: Methodology focused on the child, Civitas, Index for Inclusion, Application of the inclusive classroom, organized by the Center Vladimir Nazor. 3 teachers (15%) didn’t attend seminars except professional actives.



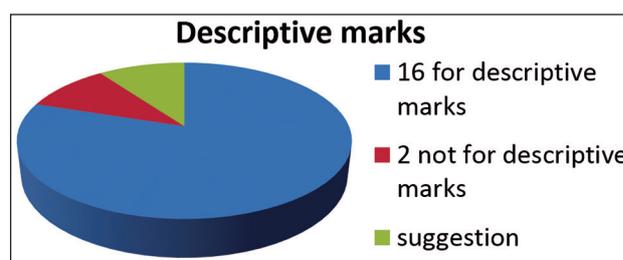
17 teachers attended seminars	85%
3 teachers only professional actives	15%

“**Education about inclusion**” - 20 teachers (100%) include in one of the forms of education about inclusion: follow the literature, find sites for inclusion, because most classes have a child with special needs, and talented students. 12 teachers (60%) in the last five years have attended a seminar on inclusive education organized by the Pedagogical Institute, the Association Duga, Center Vladimir Nazor, Municipality Novi Grad: “Index for Inclusion

in our school” (O. Š. “Aleksa Santic” and Save the children) - 8 teachers (40%); “Inclusive education” (Duga) - 4 teachers (20%); “Supporting an inclusive environment” (Duga) - 12 teachers (60%); 4 teachers (20%) “Development of IEP - Individual Education Program”; “application of methods the inclusive classroom” (Center “Vladimir Nazor”) - and two teachers (10%) of our school; “Know Numicon” (Pedagogic Institute and Duga), “The development of skills of performing functional observations and individual didactic planning”(Pedagogic Institute, Federal Ministry of BiH and Duga) and “Enhancing the Social Protection and Inclusion (SPIS) in BiH - Introduction referral model of social protection and inclusion at the municipal level” (UNICEF, Duga, Novi Grad) - 11 teachers (55%) .

Respondents believe that they are trained for an individualized approach to teaching mathematics teacher 20 (100%), and for the development of IEP need the help of the Mobile Team, 10 teachers (50%).

Descriptive marking in the opinion of 90% teachers contributes to the positive attitude of students towards mathematics. They argued that the descriptive marks motivate a student in adopting the educational content, and 10% of the teachers suggested that the first and second class stay descriptive, but in the third and fourth can be a numerical score. Only two teachers weren’t for descriptive marking.



16 teachers for descriptive marks in mathematics	2 teachers aren't for descriptive marks	2 teachers suggest that described marks could use in the first and second grades and numerical III and IV
80%	10%	10%

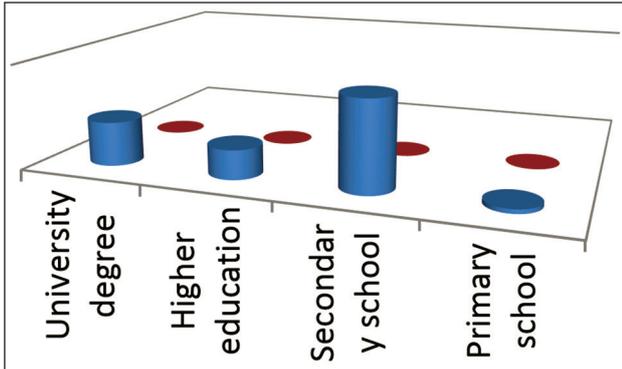
3.2. Interpretation of results (parents)

To get answers to important questions that concerning the inclusion, we decided to use targeted sample that included 80 parents of pupils elemen-

tary school “Aleksa Santic” in which the research was conducted.

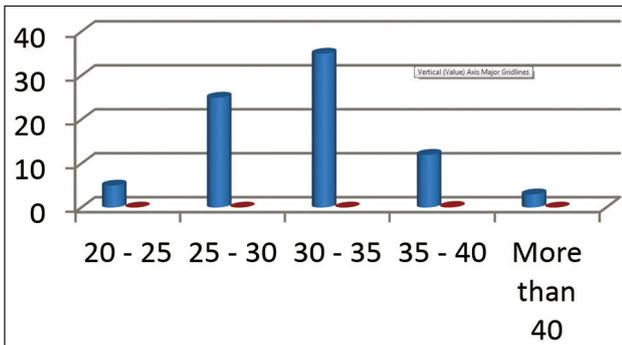
Variables (referring to the survey)

- The first variable is the education of parents (secondary, high school, university): 21 parent have completed university degree (26.25%), 14 parents Higher education (17.5%), 43 parents secondary (53.75%) and 2 parents have Primary school (2.5%).



University degree	Higher education	Secondary school	Primary school
21 (26,25%)	14 (17,5%)	43 (53,75%)	2 (2,5%)

- The second variable is the age of the parent (20 to 25, 25 to 30, 30 to 35, 35 to 40, more than 40)

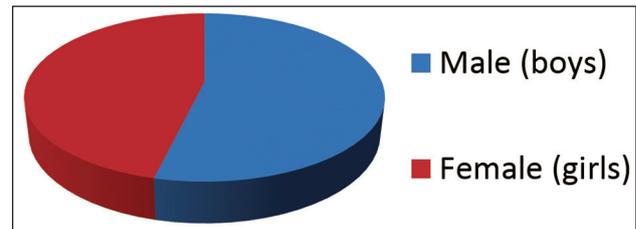


20 - 25	25 - 30	30 - 35	35 - 40	More than 40
5	25	35	12	3
6,25%	31,25%	43,75%	15%	3,75%

The graph shows that most parents aged 30-35 years, and we conclude that the favorable age of the parents.

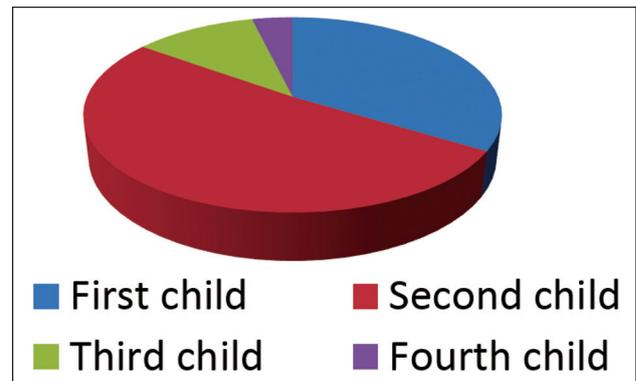
We shared polls so that each department gets 5, they divided into information meetings because it is less visited than the parents' meeting. The

poll gave the parents of 16 classes of elementary school “Aleksa Santic”.



Male (boys)	Female (girls)
43	37
53,75%	46,25%

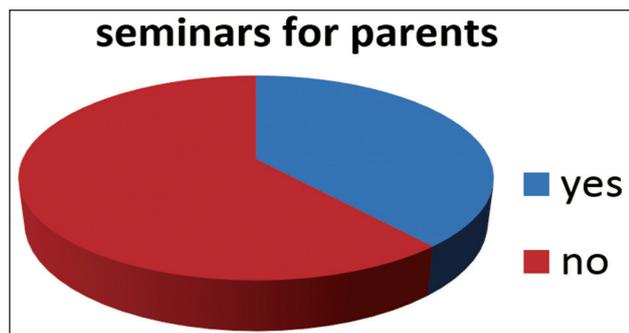
Research has shown that parents of boys account for 53.75% (43 parents), and the parents of the girl child with 46.25% (37 parents)



First child	Second child	Third child	Fourth child
27	41	9	3
33,08%	51,25%	11,25%	3,75%

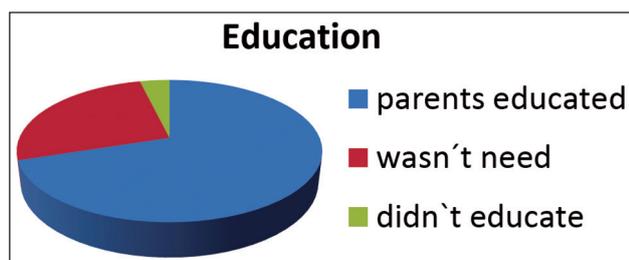
Most of the “second child” in the family, 41 children, 51.25% of the total.

To the question “**Did you attend seminars for parents?**” 49 parents (61.25%) said that they didn't, and they didn't know, didn't get the call, and 31 parents (38.75%) were at the seminar (Inclusion talented children organized by the SOS Social Centre Hermann Gmeiner and Novi Grad Municipality, Nahla - School parenting, Duga). So most parents didn't attend seminars.



31 parents yes	49 parents no
31,75%	61,25%

To the question “Have you involved in some form of education about inclusion? 56 parents (70%) answered that they read books to instruct of teachers and on their own initiative, ie. Most parents educate on their own, it would be necessary that education organize by schools.



56 parents educated	21 parents there wasn't need	3 parents didn't educate
70%	26,25%	3,75%

When asked about the difficulties in adopting mathematics respondents answered that 54 students (67.5%) have no difficulties in operation, and 26 students (32.5%) have difficulties in adopting the content of mathematics. The most common problems are: lack of concentration, lack of understanding of the task, lack of understanding of mathematics, textual assignment.

Table 1. Spearman's test of correlation

		Time spending in learning	Mark of test
Spearmanov r	Time spending in learning	The coefficient of correlation	,557
		P	,095
		N	10
	Mark of test	The coefficient of correlation	,557
		P	,095
		N	10

The cooperation of parents with teachers and schools the percentage of satisfied, very satisfied and completely satisfied parents is 65%. It is a fact that talks about good communication and cooperation of parents and teachers.

We interviewed parents about the time that student spends in learning mathematics, in a week, and Spearman's test of correlation determined the impact on the achievement of talented students.

As we can see from the table 1 Spearman's test of correlation is 0.557, which means that there is a significant relationship but it is not high.

3.3. Interpretation of research tests of talented students

We will show success t with test of 10 talented students at the beginning and end of the research, after which they were given tasks to practice and perceive their progress.

The difference is, therefore, statistically significant because the t is greater than 3.25 (the limit value for t with 9 degrees of freedom). Students demonstrated better results of test after they received assignments for training ($p < 0.05$; $p = 0.004$), which shows the results of an individualized approach and a good way for preparing the IAP for talented students in mathematics.

3.4. Total interpretation and discussion of research

From the previous review research shows that the inclusion in our school entered in a big way. Teachers accept the inclusion and inclusive teaching of mathematics and they have seen how the individual approach and individual program basis for easy the adoption of mathematics.

The attitude of the teacher, and his preparation for lesson affects directly to the level of adoption of

Students	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	Total
student Test 1	33	30	25	44	38	40	34	40	34	38	356
student Test 2	40	50	45	50	48	43	45	41	35	44	441

The results of measurements	Test 1	Test 2
n	10	
\bar{x}	35,6	44,1
σ	30,711	21,878
V	86,267	49,610
$\sigma\bar{x}$	10,237	7,293
$d\bar{x}$	8,5	
$\sigma d\bar{x}$	2,187	
t	3,886	
The level of significance at 0,01	3,25	

mathematical knowledge and the positive attitude of students towards mathematics. Teachers are ready to prepare additional tasks for talented students, individual approach to these students that they could achieve their full potential in school environment.

The research of attitudes of teachers in Primary School "Aleksa Santic" who working inclusive teaching of mathematics we noticed the application of different methods and procedures, methods of work and teaching aids in order to facilitate understanding of mathematical content. Talented students have shown their skills through solving interesting tasks and excellent results. Teachers have been educating alone, seminars and professional trainings, they feel capable of inclusive teaching of mathematics and individualized approach, 20 teachers (100%). About abilities for making the IAP 10 teachers (50%) said that they needed the help of the expert team.

The attitudes of parents are positive on cooperation with the teacher and the school, it has been observed satisfaction with cooperation, but not with training and seminars for parents. According to the opinion of parents better cooperation with the teacher contributes to better results in mathematics with their child.

3.5. The interpretation of the research to hypotheses

H_0 - There is a correlation individualized approach, IAP planning and implementation of plans

and programs of inclusive teaching of mathematics and affect adopting of mathematical knowledge on the further progress and attitude towards mathematics in gafter reviewing the results of the research that we have received through the analysis of the attitudes of teachers presented in the questionnaire and review student work, we can determine that there is a correlation individualized approach, IAP planning, implementation of plans and programs of inclusive teaching of mathematics and affect adopting of mathematical knowledge on the further progress and attitude towards mathematics in general, that confirms our general hypothesis.

H_1 - Teachers who apply different methods, procedures, forms and equipment for work, and descriptive marking in the first three grades, achieve greater progress in inclusive teaching of mathematics.

Teachers who apply different methods, procedures, forms and equipment for work, and descriptive marking in the first two grades, achieve greater progress in inclusive teaching of mathematics as we can see from the analysis of results in the polls, they consider that it is the motivation for progress in mathematics, that confirms our first hypothesis

H_2 - Students who work at an individualized approach and individual curriculum achieve better results in the learning of the content of mathematics and they motivate for further work in mathematics; students with special needs and talented students.

After reviewing the results of the research that we get through the analysis of the attitudes of

teachers presented in the questionnaire and review of students' works who work at an individualized approach and IAP - which we can determine that students who work at an individualized approach and individual curriculum achieve better results in adopting content in mathematics and motivation for further work in mathematics, as evidence by our second hypothesis

H₃ - Teachers who have passed a greater number of professional training and education are more ready for work for inclusive teaching of mathematics, individualized approach and individual planning. After analyzing the attitudes of teachers who are 100% have been involved in training about inclusion, we realized that teachers educate independent, at seminars and professional trainings.

H₄ - Parents who cooperate with teachers and schools contribute to their child's progress in the implementation of mathematics.

Parents have declared that they are very satisfied with the cooperation with teachers and school and could see progress of their child in the work of mathematics when they cooperate regularly, in the percentage of 79%, that confirms our fourth hypothesis.

However, in surveys parents have indicated that they self-educated and in the workshops of the school, but they haven't attended the general courses in large numbers, and for inclusion, that is necessary to organize seminars for parents.

H₅ - Students' papers show the progress of students in inclusive teaching of mathematics. After reviewing the students' works of students with special needs: Students with special needs (first part of the research) and students' works of talented students (The third part of the study), we have observed the progress of students in inclusive teaching of mathematics, that confirms our fifth hypothesis.

4. Conclusion

On a sample of 20 teachers and 80 parents of pupils in primary school "Aleksa Santic", the goal was to see more clearly the current theoretical considerations in inclusive teaching of mathematics in primary school and encourage acceptance of individualized approach and individual planning in mathematics as a process of observation, monitoring, analyzing, evaluating and improving the

quality of the adoption of mathematical knowledge in primary schools.

In accordance with setting the goal of the results of the research showed that education, attending seminars on inclusion, cooperation with parents, using different methods, procedures, forms and equipment for work and exchange of experiences of teachers are a prerequisite quality of work in inclusive teaching of mathematics in primary school. School as an educational institution has an important and permanent role in the construction of approach to pupils with special needs and the foundations of mathematics and its use in everyday life. The school is responsible to ensure the continued progress of students as intellectual and social person in accordance with their abilities and inclinations. Teachers who were trained, apply a variety of methods, forms and equipment for work, and work with parents and the community.

By participating in various projects with the Municipality of Novi Grad, SOS Social Center Hermann Gmeiner, Pedagogical Institute, Duga, Save the Children and other organizations, has created all the necessary elements to make the inclusion and involvement of students and parents together with the teaching staff in achieving the goal of inclusive schools. Inclusive education in mathematics has applied in working with students at an individualized approach and individually adapted programs. It is important to point out "that mathematics is not its own purpose and should correlate with other subjects, particularly in primary school" (Shapiro, 2005). "Correctly counting, calculating, noticing, analyzing, developing logical thinking and reasoning are forms which we should insist" (Gould, 2007) and it should observe and develop every day regardless of the timetable. Our research has shown that teachers make good progress in mathematics, as we have seen in the works of students. The progress of students we have shown t test comparing initial test and after adjustment of the program to talented students. Cooperation with parents is the success of inclusive mathematics, of course, it is necessary to continuous education of teachers, and parents in this area. Based on the declaration the parents of the pupils' training time of mathematics we have determined Spearman's coefficient of correlation on the basis of which we can see better results in students

who work mathematical content more. In order to know to work in inclusive classroom and facilitate learners with special needs, and talented students, a teacher should be aware of lifelong learning, which includes acquiring and modernization of all kinds of abilities, interests, knowledge and qualifications, and a constant exchange of experience with other teachers from our school and from other schools, but also the possibilities to follow the professional mathematical literature.

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