INTEGRATION OF YOUNG STUDENTS WITH OUTSTANDING MATHEMATICAL ABILITIES TO CREATIVE TEAMWORK

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ABSTRACT

In order to respond to the dynamics in the development of economic, social and public life, school education should very quickly and flexibly offer new educational policies and put into practice new technological solutions.

In the context of inclusive education, the development aims to present an idea to include the outstanding students in mathematics to additional creative work in a team, which will best satisfy their needs of: expression of their personal potential and opportunities, communication in a creative environment of like-minded people, development of their mathematical abilities and acquisition of key competencies.

Key Words: Inclusive education, creativity, mathematics.

INCLUSIVE EDUCATION

A few years ago the Bulgarian Ministry of Education, Youth and Science (MEYS) decided to introduce the concept of Inclusive Education, as part of the new education policy. For people who are interested in educational policies, both in Europe and worldwide, this is not a new concept.

THE “INCLUSIVE EDUCATION IN BULGARIA” report (2006, p.5) issued by the Save the Children Foundation defines the inclusive education as “a process that seeks to eliminate all forms of segregation in education, to include children who feel vulnerable or isolated for any reason, and to encourage and foster the participation of all children in the educational process. Inclusion in education is based on the recognition that all children are different and that schools and the educational system as a whole have to change to meet the individual needs of all learners (with or without special educational needs (SEN). Inclusion is expressed in reorganization of the Bulgarian school policies, practices and culture, so that it can meet the diverse educational needs of school children, and encouragement of active participation on their part. At school base level, this means provision of accessible architectural environment, qualified teaching and support staff, individual training plans tailored to the potential of each child with special educational needs, well-equipped specialized school rooms, permanently employed resource teachers, psychologists, speech therapists, etc.”

The term Inclusive Education derives from English and means adapting the school system to the child, and not the child to the system. It means education for all, i.e. it includes all students, regardless of their different characteristics, including race, gender, age, ethnic origin, religion, alleged level of ability or disability, HIV status, etc (Slee, 2001b).
The general concept underlying the inclusive education is that every child should have access to quality education in the mainstream school system and is aided in the learning process. In this regard, every child, regardless of one’s differences, can and should be educated in mainstream schools. Inclusive Education seeks to meet the needs of every child by paying special attention to groups of children who are at risk of being socially isolated or excluded from mainstream education.

Inclusion concerns not only the education of children with disabilities, but the provision of quality learning conditions for all learners. The nine guiding principles of inclusive education adopted by the Alliance for Inclusive Education in March 2002 are based on the main principle of respect for each individual:

1. A person’s worth is independent of their abilities or achievements.
2. Every human being is able to feel and think.
3. Every human being has a right to communicate and be heard.
4. All human beings need each other.
5. Real education can only happen in the context of real relationships.
6. All people need support and friendship from people of their own age.
7. Progress for all learners is achieved by building on things people can do rather than on what they cannot do.
8. Diversity brings strength to all living systems.
9. Collaboration is more important than competition.

The school is a reflection of the community in which everyone lives. World globalization leads to diversity in the school environment. Now schools provide education to children of different races, cultures and religions, and different abilities and disabilities. Inclusive Education means that all students in a school, regardless of the differences already mentioned, physical and mental characteristics and abilities, become part of school community. They are associated in their sense of belonging to the other students, teachers and non-teaching staff.

No school community can meet the variety of needs of its various students, but it must continue to look for opportunities and solutions, even when it has no resources to address this issue. There is nothing wrong with that, if a school admits its inability to address such issues and seeks external support. However, the support that the school and teachers in particular receive should help the school community to make changes to the way of teaching on its own. No teacher should expect that the external experts (resource teachers, psychologists, speech therapists, etc.), that are available to them, will solve their problems with Inclusive Education. Anyone working in education, or connected in any way with it, must understand that one cannot work as before. It is important to seek professional standards, and not what seems easiest and subject to its own logic.

If a society values children development and their ability to learn and live together, in order to deal with the challenges of life – with its joys and difficulties, then their special educational needs become a natural part of the whole experience. The whole experience which requires teaching competence to work with all children, school hospitality, and confidence that every child can acquire the necessary minimum of knowledge in every academic discipline on the curriculum.

To make this idea a reality it is necessary to produce a mechanism for daily functioning, operating rules and procedures, practical application resources, as well as sanctions for non-compliance. This means:

- To establish an adequate methodology for assessing the child’s capabilities and provide the necessary resources for its inclusion;
- To make rules for the interaction between the different institutions that are relevant to the child development;
- To propose various forms of training and selection procedures (in the course of work);
- To provide assurance for meeting the child’s needs, and not those of the school or the system (UNESCO, 2009).
Inclusive Education seeks to develop a methodology aimed at all children which recognizes them as individuals with different needs in learning. Inclusive Education seeks to develop a teaching and learning approach which will be more flexible and satisfying for the different needs in learning. If learning and teaching become more effective as a result of changes introduced by the Inclusive Education, then all children will benefit (not just children with special educational needs).

According to the Salamanca Statement (Salamanca, Spain, June 7th-10th, 1994) on Principles, Policy and Practice in Special Needs Education:

• Every child has a fundamental right to education, and must be given the opportunity to achieve and maintain an acceptable level of learning;
• Every child has unique characteristics, interests, abilities, and learning needs;
• Education systems should be designed and educational programs implemented to take into account the wide diversity of these characteristics and needs;
• Those with special educational needs must have access to regular schools. The schools have to provide conditions to satisfy such needs, based on child-centered pedagogy capable of meeting these needs;
• Regular schools with this inclusive orientation are the most effective means of combating discriminatory attitudes, creating education for all. Moreover, they provide an effective education to the majority of children and improve the efficiency and ultimately the cost-effectiveness of the entire education system.
• Inclusion is a process of increasing the degree of participation of each student in the academic and social life of the school, and decreasing the degree of students isolation in all processes within the school;
• Inclusion calls for restructuring of the school culture, its rules, internal procedures and regulations in order to be able to fully accept all the diversity of students and their personal characteristics and needs;
• Inclusion directly involves all students in the school, not just the vulnerable groups such as children with limited opportunities;
• Inclusion is oriented towards school improvement, not only to students but also to its teachers and additional staff.
• The desire to give access to the environment and the learning process requires a more general and conceptual approach to be taken;
• Each student is entitled to receive education in the school closest to one’s home;
• Diversity and differences between the children do not appear to be a problem requiring solutions, but it is rather an important resource that can be used in the educational system;
• Inclusion implies the presence of close relations, based on friendship between schools and the communities in which the schools exist.

“Integration” and “Inclusion” are terms that are often used by teachers as synonyms. The difference between the two terms is essential. Integration programs are intended to attract children with different abilities in an existing school life and school structure. The purpose of these programs is to help the integration of children in the existing educational model.

Inclusion differs from integration in that, that at the outset all children, with no exception, are considered part of the educational system. Children with special educational needs (SEN) do not require special adaptation as they, at the outset, are part of the school system and each school is ready to welcome children with different abilities. This requires substantial changes in the structure and functioning in school, but also in the views of the teachers who are used to working with certain groups of children with no special educational needs. Thus, inclusion is a process of development of accessible education for everyone, in accessible school and educational institutions. The learning process consists of adequate personalized goals for all students, process of liquidation of the different barriers in order to maintain each student and maximum disclosure of its potential.
INCLUSIVE EDUCATION ISSUES

The problems faced by participants in the educational process in the initial stage of the implementation of Inclusive Education are:

Problems for teachers

The idea of Inclusive Education will actually take its place in the educational process only when it conquers the minds of teachers and become part of their professional thinking. Special effort is required in order to do this. Experience with introducing Inclusive Education shows that teachers and other professionals do not start immediately matching the professional roles that are required for such form of teaching. They go through several stages: starting from the obvious or latent resistance, passing through passive behavior, and then to the active acceptance of what is happening. A large number of teachers in the primary stage of education (7-10 year old students) doubt their abilities: “Can I handle this challenge.” They understand the responsibility they must assume and fear that they will not handle the preparation, planning and implementation of the Inclusive Education. They are afraid to take that risk and the consequences of possible unfinished work.

Mainstream school education contains precisely laid standards and criteria for evaluation of learning outcomes in different academic subjects. According to large proportion of teachers, children with more severe disability or mental abnormalities could not meet these standards and criteria, and there are no statutory objectives, goals and expected learning outcomes for the separate subjects by classes for children with special educational needs.

The teachers also express concerns regarding:
- Large differences in the training and abilities of students in the same class;
- According to them the regulated lesson of 40 minutes is insufficient to implement personalized learning approach;
- Lack of experience and specialized psychological and methodological training are obstacle in the implementation of the ongoing inclusive process;
- Lack of solutions to issues emerging in the work process;
- The need to seek help from students, parents, psychologists and resource teachers, recognizing that they cannot handle with the problems.

Advice that they are given in such cases are:
- “You have to do your work, despite everything”;
- “You have to face your fears and continue to work through them, and then they will become lesser and disappear.”

Problems for children without SEN and their parents

Parents of children without SEN sometimes express concern that the presence of children who need special support in the class may hinder the development of their own child. Parental concerns are mostly related with doubts and hidden mistrust in the teacher, in particular, in his skills in such situation (presence of a child (children) with SEN in the class) to maintain previous cognitive level, and even build-up the knowledge, skills and competencies of their children. In the talks with them, they recognize that children with SEN need more attention and care, but are afraid of ignoring their own children. A few of them react hasty and inconsiderate by moving their child to another class or school.

Of course, that a good teacher training and qualification, such a step by the parents is extreme. In order to avoid such incidents it is necessary for the parents of all children to be familiar with the objectives of Inclusive Education, with its advantages and disadvantages and thus to dispel negative attitudes in some of them. Furthermore, when parents are aware of the new education policy, they become involved and willingly participate in the educational process in one form or another.
Overcoming barriers in learning

Inclusive Education is a process of mainstream education development, which implies access to education for all, by adapting it to the different needs of all children. Thus, the core of Inclusive Education is the ideology that excludes any discrimination of children, provide equal treatment to all children, but also creates special conditions for those who have special educational needs. We are talking primarily of handicapped children having disability in their psychophysical development.

The key principles of Inclusive Education represent the joint training and education of all children in the same age group in kindergarten and school. Inclusion is a natural process and cannot exist in an environment where some children are fully or partially separated from their peers in the learning process. Education of children, some of whom are in special schools, and another in mainstream schools is not inclusion. Education of children in mainstream schools in segregation and special conditions is not inclusion. Education of a child with special needs in an ordinary class under program and content of mainstream education environment cardinally differs from what its peers in this class work with – this is not inclusion (Loreman & Deppler, 2001).

Inclusion means full inclusion of children with different abilities in all aspects of school life in which all other children are involved with pleasure and joy. This requires a real adaptation of school space in order to meet the needs of all children without exception, to appreciate and respect diversity. This does not mean that the inclusion does not require providing children with different abilities with special assistance and support in lessons or training outside the class, if necessary. Different options appear periodically and are required virtually by all students in the class. (Loreman & Deppler, 2001).

Inclusive Education components

Inclusion of all children with different abilities at school they can attend;

- The amount of children with SEN in school should be proportional to the total number of children in this city or area as a whole;
- Lack of “triage” and selection of children in mixed groups;
- Children with special needs are placed in class corresponding to their age;
- The presence of situational conditioned interaction, coordination of resources and teaching methods;
- Efficient and decentralized models of learning as style of work at school (Sailor & Skrtic, 1995).

Every teacher with experience in teaching children with SEN in mainstream schools said that the inclusion of such children is a complex and complicated process. In order to succeed, the teacher must be highly qualified and motivated professional. The high qualification and motivation of teachers is necessary for effective training, which is absolutely essential for every school. Improving the quality of education through innovative inclusive educational practices is the primary goal of the activities of each teacher and each school (Loreman & Deppeler, 2006).

The issues most discussed by the teachers were:
   - Does the inclusion really work?
   - How to organize the inclusion work in schools?

The answer to these two questions is complex and may disappoint those looking for a quick and simple answer. Inclusion in school does not always work. There are a lot of researches, who assume that the inclusion of children even with severe and multiple developmental disorders can be successful, if there is a culture of shared values and sincere passion for improving training technology in the school(Giangreco, 2001; Grenor-Schreyer, 2001; Loreman, 2001).

The most frequently cited reasons of why inclusion does not work are:

- The advantages of inclusion are not discussed with those involved in the implementation of this process.
- The changes taking place in the school are excessive or vice versa, limited or insufficient.
- The required changes are made too quickly or very slowly, which results in reduced enthusiasm.
Lack of resources, which, even if available, do not always guarantee that the inclusion will work. Resources can be used irrationally.

Lack of permanent incentives for the formation of attachment to the idea of Inclusive Education.

Key associates determining the success of inclusion are not attached enough to the idea or vice versa, too much work is implied on them, which gradually alienates them from the implementation of inclusive cause.

Parents as partners do not participate adequately in the school life.

Heads of schools frequently carry out excessive control or their management style is ineffective, or does not support the achievement of higher goals by the team.

The inclusion appears somehow isolated in relation to other school initiatives.

Teachers lack the necessary skills and qualifications.

The inclusion requires modification of curricula and programs to suit children with different abilities.

Insufficient time for planning work on the inclusion of students with different abilities in the educational process (Giangreco, 2001; Grenor-Schreyer, 2001; Loreman, 2001; Jasutske, 1997).

The second question too has no definite answer. Inclusion depends much on the context; therefore there is no universal formula for successful inclusion of children in each class or school. Inclusion works where teachers understand and demonstrate effective training under conditions of cooperation and support from the whole school community.

CONCEPTUAL PROJECT

In order to respond to the dynamics of the economic, social and public life development, school education should very quickly and flexibly offer new educational policies and implement new technological solutions in practice. It should open its doors wide for elective courses and extracurricular activities for children, which will help to open up new and wider horizons for their future.

The elective courses suggest each child should choose one of several subjects, the one that is of most interest and in which the child wants to enrich its knowledge. In practice, however, the primary teacher is the one who chooses for the whole class what will be the elective course that students will learn and it is included in the class curriculum. This practice is wrong, but it facilitates the teachers in the preparation of classes’ curriculum. Preferred elective courses of the initial stage of a secondary school (SS) are: mathematics, Bulgarian language and literature and English. Classes intended for these subjects are used by some teachers to clarify the new knowledge acquired in regular mathematics classes, in order to exercise algorithms, etc. and very rarely to build-up the students’ knowledge, skills and competencies. This leads to the disadvantage of students with outstanding mathematical abilities.

In the context of Inclusive Education the project aims to present an idea to include outstanding mathematics students in additional extracurricular creative teamwork, which will best satisfy their needs: expression of their personal potential and opportunities, communication in creative environment of like-minded, development of their mathematical abilities and acquisition of key competencies.

For the purpose of the project, as inclusion of talented mathematics students in additional creative work, we will assume the organization and involvement of younger students in extracurricular activities in the form of math club.

Name of project: “Young Mathematician Club”

The idea of establishing a “Young Mathematician Club” was born, after discussion with the primary teachers of a base practicum school for Plovdiv University “Paisii Hilendarski”, Plovdiv (Bulgaria), on how to include children with outstanding mathematical abilities in Inclusive Education and how they could to help their peers with the same interests to develop and demonstrate their potential.

Questions that the initiators of the idea of creating a “Young Mathematician Club” had to answer before the initiating the club establishments were:
- Is this extracurricular form of learning by interests will compensate the outstanding mathematics students in terms of developing their mathematical abilities and educational needs;
- Whether the children with special educational needs, but with a keen interest in mathematics, will be involved in this initiative;
- Will the school management and parents welcome and support the idea of a form of learning in which children regardless of gender, ethnicity or religion will communicate and develop their potential together as a team.

Teachers’ higher qualification and extensive experience was a guarantee for a successful start of this project. Moreover, they were well motivated and enthusiastically accepted their inclusion in the project. The project was discussed and coordinated with the school management, teachers and parents of all children in 3rd grade, because these classes have children with SEN. The school management has given its consent to initiate the project and assurance of assistance and support to the team if needed. The parents, after detailed examination of the purpose, features, activities types, rights and obligations of members (in this case their children) in the club, endorsed this initiative and offered their services to support the activities of the club and the performances of their children. All parents (of healthy children and children with disabilities who are interested in mathematics) were unanimous in their opinion that the proposed idea of establishing a “Young Mathematician Club” will bring their children closer, the teamwork will teach them to respect the opinions of others and make them more responsible and tolerant on the one hand and on the other will help improve their basic mathematical competence. Support granted from school management and parents was facilitated with financial support.

The next step towards the realization of the idea of establishing a “Young Mathematician Club” was sharing it with children and the recruitment of club members. Children were explained that membership is voluntary, i.e. each child at its own discretion (with the consent of their parents) can be a member of this club, as the only condition was to like math and be willing to engage in teamwork with its classmates. Children learn that all decisions regarding club membership, chair of the club, elaboration of club rules and regulations, and the activities types will be decided by them. One of the 3rd graders teachers will act as honorary chairman and coordinator and the other as his deputies and honorary members.

Initially, a large number of children expressed desire for membership in the “Young Mathematician Club”. Even those who do not have great interest in mathematics and handle the educational math content with some difficulty expressed their desire to enroll in the club. The high interest, we believe, is due to the desire of children to participate in something different and interesting.

Currently the club has 15 members of which 12 children of Bulgarian origin, 2 children of Turkish origin, and one child from Roma origin. Three of the children are with different type and degree of disability. One is suffering Hyperlexia, the second suffers vision disorder, and the third suffers damage to the musculoskeletal system. The child with Hyperlexia is a boy with unusual cognitive and visual-motor abilities, regardless of the overall disparity. Besides the permanent club members, another 5 children signed as associated members, which due to family reasons cannot regularly attend club meetings and be actively involved in its activities.

In the presence of the teacher (Honorary Chairman), other teachers (Honorary Members) and a representative of parents, the children elected the best mathematician among them for club's president. On their own initiative as a member of the club was elected a parent with university degree in mathematics, who has previously assisted and sponsored various activities and events.

At the next meeting of the club, the children elaborated Rules and Regulations of the “Young Mathematician Club.” The Rules of the club regulate the obligations and rights of each member, namely:

**Obligations:**
Each club member undertakes to:
- Attend each club meeting;
- Actively participate (to the extent possible) in the club activities;
- Respond to requests for assistance from a classmate;
- Be respectful to other club members;
- Participate in the distribution of assignments among the club members and perform its tasks properly and in due time.

**Rights:**
Each club member is entitled to:
- Propose amendments to the Rules and Regulations of the club;
- Vote for president of the club;
- Propose activities for the club to perform;
- Express their opinion and vote in decision-making;
- Make suggestions and vote for the inclusion of new club members;
- Receive assistance in case of failing to perform the task assigned by the club;
- Be absent from club meetings, only for valid reasons;
- Invite guests to the club who are interested in the club activities and want to help.

**The Rules of the “Young Mathematician Club”** state the conditions under which club membership is granted or taken away, number of participants and place of meetings of the club, agenda with activities and events, the form of reporting the club financial costs.

**Terms and Conditions of Membership:** Any student who shows very good or excellent results in mathematics and wishes to participate in the club activities should submit a request to the President of the club and is approved by its members. The latter collectively discuss and decide whether the applicant classmate is responsible and has the potential to perform the tasks assigned.

**Withdrawal of membership** is also a collective decision. Any member who does not consider the club activities with due seriousness and commitment and does not fulfill its obligations may no longer be allowed membership in the club.

The Rules and Regulations of the Club will be elaborated and adopted by the members of the club, after review and approval by its honorary chairman and members.

It was decided to hold club meetings once a week. The day of meeting was accepted to be every last day of the school week (Friday). Since the young students at this school are taught all day (morning regular classes and afternoon study activities) it was adopted for the meetings and club activities to take place in the afternoon in the time provided for classes of interest. The place of meetings will be a specially equipped room, the so-called “Igroteka (Playroom)” which is modernly furnished and equipped with modern computers and multimedia equipment. The environment there predisposes to creative mood and inspiration. The duration of the club activities is one lesson of 40 minutes. In case of preparation of larger events, the weekly club meetings may be more than one.

Preparing the program and specifying the types of club activities and events took longer than expected. The math teachers, which are directly involved in the project, offered the children a template program with club activities and deadlines. Each club member was tasked to examine the template program alone or with the help of its parents and share its proposals for changes and additions to it with the rest of its classmates of “Young Mathematician Club.” After discussion the following work program was adopted for the entire school year.

**Program**
1. Club Activities.
2. Mathematics board “Math – interesting, easy and useful”.
3. Mart Quiz “Every 2nd graded knows that”.

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4. Collection of assignments “Math Holiday”.

Club sessions are once a week. A separate program will be elaborated that fixes the topics that will be considered. In this program elaboration are involved mainly the math teachers who are honorary members and the chairman of the club and is approved by all members. Adoption of the program will take place at the first club session.

Topics included for consideration are directly related to the specific mathematical content included for study in the state educational requirements for the specific class, but also include the additional knowledge and skills in the subject, and rich in content and form competency oriented mathematical assignments. The topic of each session is stated in advance, i.e. at the end of each club session the members are informed about the topic of the next session. This is done in order to enable every member of the club to prepare and submit their materials (problems, puzzles, riddles, drawings, fun games, etc.). The sessions are supervised by the math teacher, the President or a member of the club. The leading figure during the sessions is the math teacher. A club member can lead an activity, if previously stated such wish. The honorary club members or external speakers are invited at least twice a semester as guest lecturers.

For each semester of the school year, the club will prepare two pieces Math Boards “Math – interesting, easy and useful.” The boards are entirely designed by the children – members of the club. They are free to choose the Math Boards entries, allocate tasks, perform selection of content, and draw the design. The finished boards are placed at a location that is accessible to all children. A box is placed under the boards in which every child can submit the decision to an assignment or response to a question, riddle or puzzle. After a certain period of time the box is opened and after answers check is announced the name of the student who gave most accurate solutions and answers. The winner receives a prize and a proposal to join the club.

At the end of each semester, the club holds a Mart Quiz “Every 2nd graded knows that.” Teams from all second grades in school participate in the quiz (2a, 2b, 2c). The questions for the math quiz are collected by the club members during the whole semester in a folder specially intended for this purpose (hard copy and digital), which is held by the teacher – Honorary President of the Club. Prior to conducting the quiz all collected materials are sorted by theme and difficulty and those that will be included in the quiz are selected. All club members are actively involved in the preparation of the quiz, as each is involved according to its desires and capabilities. Children put imagination and creativity in order to prepare a nice competition with lots of prizes and fun.

At the end of the school year, with the help of the entire school management, teachers, parents, and club members issue a collection of assignments called “Math Holiday.” The idea of the club is for every child from the 3rd grade to get a digital version at the end of the school year (and hard copy if possible) of a collection of assignments on various math topics studied during the year. The club kids collect the assignments throughout the entire year. They select the assignments from collections of books on mathematics, mathematical competitions, internet, and other sources. One of the assignments is elaborated by the children with outstanding mathematical abilities. The collection is edited by the Honorary Chairman and club members, which then finance the issue. At the end of the school year every 3rd grader receives a gift for holidays from the “Young Mathematician Club”.

CONCLUSION

In conclusion we would like to say that the “Young Mathematician Club” Project works. The stage, at which it is currently implemented, shows more than encouraging results in the inclusion of the “different” children in a unifying cause – mathematics. In a next article(s) we will share details of the project and its results.

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