



Co-funded by the
Erasmus+ Programme
of the European Union



Needs analysis

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1. Background

The partner institutions formed three national university-school-pairs and analyzed the needs of schools and teacher training institutions with respect to learning software for migrant students. Taking into consideration the immigrant students report that has been produced at the onset of the project, the specific needs of the partner schools in Austria, Italy, and Slovakia as well as other schools in these countries that have been contacted by the project team, a list of potential topics for learning software products was developed, consolidated and finalized by the project consortium.

2. National reports

2.1 Austria

The Austrian university-school-pair considered the question why it is feasible to develop mathematics learning software for pupils with a migrant background (for Austria in general and upper secondary schools in particular), and through discussions with teachers, teacher trainers and students came up with a number of reasons to do so:

1. The number of pupils with a migratory background is constantly increasing.
2. Performance reports such as tests are often not satisfactory and frequently result in an overall negative evaluation of target group pupils.
3. Attending the regular and obligatory mathematics lessons is usually not enough to compensate for existing learning deficits. Therefore, the learning software is supposed to provide support and exercise outside of lessons.
4. Facilitation of better integration during regular lessons
5. The lack of appropriate language skills requires a simplification of subject matters and technical terms. This fact often remains unconsidered within regular lessons. Cutting back on the use of scholarly language in general, linguistic simplification and visualizations of tasks and solutions should prove instrumental in this regard.
6. Raising motivation, ambition, self-esteem and enthusiasm for the subject: The learning software is meant to playfully lead students towards individual learning success without a class intern frame of reference and without being pushed for time.
7. Through the use of subject related games, the opportunity arises to deal with Austrian issues in general and therefore to further strengthen integration.
8. Unique chance to convey to the pupils that they matter to us on an emotional level

The Austrian team suggested the following topics for the learning software:

1. Calculations with terms (1)
Being able to produce, interpret, convert and mathematically justify simple terms and formulae; using simple potencies; working with terms and formulae to calculate percentages
2. Calculations with terms (2)
Calculating with potencies and roots; using fraction terms; binominal formulae; produce and interpret terms and formulae
3. Linear equations
Using appropriate techniques to find the solution for linear equations with one unknown variable; using equations for cracking subject and non-subject related problems
4. Linear Equations with two variables
Using adequate procedures for solving a system of linear equations (two equations with two variables); assessing the solvability of these equation systems; geometrical interpretation; applying linear equation systems to crack subject and non-subject related problems; perceive connection with linear functions

5. Functions

Interpretation, visualization and description of functional dependencies which can be variables in real-valued functions (using terms, tables and graphs); working with functions in application-oriented fields

6. Linear functions

Being aware of properties, application and interpretation; properties of direct proportional functions among others; working with linear functions in application-oriented fields

7. Special functions

Description and interpretation of simple non-linear functions (e.g.: a/x , a/x^2 , quadratic functions ax^2+bx+c , including graphic visualization, interpretation and application)

8. Statistics

Interpretation and visualization of data using appropriate statistical terminology (e.g.: mean, weighted arithmetic mean, median, quartile, relative frequency, scattergram, histogram, boxplot)

Further topic recommendations were made:

- Quadratic equations and quadratic functions, exceptional cases
- Sine, cosine, tangent calculations and applications within rectangular triangles
- Using vectors in R², simple mathematical operations, geometric visualization, simple applications

2.2 Slovakia

Education in Slovak Republic with focus to immigrants

Legislative documents which include elements of integrative and inclusive education in Slovak republic are represented by several laws and official documents approved by Slovak National Parliament and Government of Slovak Republic.

- Law on assistance in material need (approved in 2003)
- Law on state administration in education and school autonomy (approved in 2003)
- Law on financing primary schools, secondary schools and school institutions (approved in 2003)
- Law on equal treatment in certain areas and protection against discrimination (approved in 2004)
- Law on education and training (Education Law, approved in 2008)
- Law on subsidies by the Ministry of Labour, Social Affairs and Family SR (approved in 2010)
- Decree of school facilities for educational counselling and prevention (approved in 2008)
- Decree of 2008 on the purpose of the allowance for pupils from socially disadvantaged environment (approved in 2008)
- Decree on school children's clubs, school activity centres, community leisure centre, school property and vocational practice (approved in 2009)

The Slovak Government assented to the membership in the European Agency for Development in Special Needs Education in November 2011. This act enabled Slovakia to be a part of the international professional platform supporting the development of inclusive education where school respects diversity and individuality of child, pupil and student. Inclusion in education, as the challenge for change of some processes in education system in Slovakia have begun to define after January 2012, when the Slovak government adopted a concept of inclusive education.

The government, subsequently, on February 20th 2012, highlighted the need for legislative definitions of segregation and inclusion in anti-discrimination law, in the law on education, and in the

following relevant legislative decrees and acts. The concept of education from the January 11th 2012 highlighted the necessity to develop "a specific model of school inclusion for different situations and target groups with the ambition to create a general model of an inclusive school".

The Committee for Research and Education in Human Rights is working under several governmental as well as NGO organizations. The committee meets once a year. The direct output to the everyday school life of schools in Slovakia was the result of the committee meeting in March 2017. It is the chapter incorporated to the Paedagogical and Organizational Rules for Schools in School Year 2017-2018 dealing with problems and instructions of education of pupils with special educational needs, where children of immigrants are named as one part of.

Since the problem with refugees and immigrants is not so urgent in Slovakia (Slovakia was out of refugees prefer target countries in 2014 – 2017, only 146 people asked for asylum in Slovakia in 2016), the model of inclusive education is dominantly focused to Roma pupils. Roma children (3 – 6 years old, kindergartens) and pupils (6 – 19 years old, primary and secondary schools) are officially named as pupils from socially disadvantaged environment. Together with children and pupils with developmental disorders, behavioural disorders, illnesses and poor health are officially and generally (by the school law) understood as pupils with special educational needs (PSEN). Paradox of this label is, that talented and gifted pupils belong to this educational category; too even the models of special educational needs of talented and gifted are obviously different.

Methodological and Pedagogical Centres in the Slovak capital Bratislava and in towns Banská Bystrica and Prešov, as institutional bodies for direct application government policy and model of school inclusion forming, have implemented three major national projects in years 2011 – 2015.

- a. Education of teachers for inclusion of marginalized Roma communities (MRK 1) Duration: October 2011 - January 2015.
- b. An inclusive model of education in pre-primary levels of education (MRK 2) Duration: March 2013 - November 2015.
- c. PRINED - Project of Inclusive Education (MRK 3) Duration: April 2014 - November 2015 [2]

Projects aimed at implementation of elements of inclusive education of Roma children in kindergartens and Roma pupils in primary schools. Projects promoted many activities focused to mapping, comparing and analysing the situation in different regions in Slovakia as well as came up with active fieldwork aimed to professional training of teachers and assistant teachers in methods of inclusive pedagogy.

Since the education of pupils with indicated PSEN dominantly takes place in regular classes, together with other pupils with standard needs, the general model of inclusive education is the essential educational element Slovakian schools and teachers call for. One of the partial knowledge, project participants and experienced practicing teachers in Slovakia should be familiar with, describes the following table (Tab.1), where previous principles of integration of PSEN pupils to standard class is compare with inclusive principles.

Some activities of teachers training within the projects mentioned above were dedicated for preparing the class teachers, generalists as well as two subjects specialists, in collaboration with the special education teacher, teacher assistant, or external expert and consultant in special pedagogy and other special practitioners. Centres of Pedagogical and Psychological Counselling experts have been included to the projects. Mission of the centre, which is established in every Slovakian county town, is to work as the first aid place and permanent supporting place for schools and teachers and also parents in recognizing and solving any educational problem with PSEN child or pupil. Projects participants were also trained how to prepare and use individual education program for one

particular pupil, for instance developing such special individual plan for one, several or all school subjects. The other topic of training was how to include inclusive education principles to School Educational Program, with respect of the culture and character of the particular school in the village, town and region.

State Educational Program

Among the aims of education, which are declared by the State Educational program (intended school curriculum, SEP) for primary and secondary schools in Slovakia is to support cognitive activities that are expressed in terms such as: own active discovery, investigation, inquiry, search, detection of something new by an experiment, interpretation of the inquiry and creating heterogeneous verbal description of discovered elements and situations.

The creation of these cognitive activities can be broadly summarized especially in:

- development the ability of pupils to know and want to learn;
- strengthen the confidence of pupils in solving problems that are associated with learning;
- keeping pupils active citizenship;
- participation in defining moral values of decent man.

The general objectives of education and training declare also:

- development pupils' social abilities with an emphasis on communication and knowledgeable cooperation,
- guide pupils to exercise their own rights, fulfil their obligations and respect the rights of other people.

The graduate profile of primary and secondary school includes following terms with respect to the inclusiveness:

- accept diversity as a natural part of society;
- know and assert own rights and respect the rights of others;
- be aware of the potential to become active citizens in national and global context.

Educational Themes

Educational themes are domains within SEP composed by school subjects. Inclusive education is explicitly mentioned in two educational themes: Man and Society, Man and Values.

Man and Society

The educational theme Man and Society consists of school subjects: history, geography with its humane component and civics along with relevant topics that are also present in other educational themes and school subjects. The aim of this educational field is to acquaint pupils with the development of human society, with the most important social phenomena and processes that translate into everyday life and see the world in integrating the correlation between man and a society in a given geographical area. Knowing the history of the own nation and peoples of Europe and the world, familiarity with geographic characteristics of the homeland and regions of the world and the formation of positive civic attitudes is a prerequisite for obtaining civic competencies that are key in education. Pupils through knowledge about the nearest environment (family, school) get a part functional knowledge and competence of their immediate social environment, the local community, the region and the other regions of Slovakia. Pupils are also encouraged to understand their own place and role in society as well as to formulate their attitudes and actions exhibited civic activities, responsibility to themselves, their loved ones and the country in which they live. Educational field opens the way for cultivation of individual and social competences. Pupils learn to

see things and events together, cope with arguments of creative solutions of problems and learn principles of critical thinking. At the same time the sense of belonging to the civilization and cultural environment is developed and strengthened.

Man and values

The main task of this educational area is to actively participate in shaping the personality of pupils with their own identity and value orientation in which respect for the man and to nature, cooperation, pro-sociality and universal human values occupies an important place. In fulfilling this objective is not satisfied with just providing information on moral principles, but also promotes understanding and interiorization (internalisation) moral standards, and facilitates learning of behaviour that is consistent with them. Preparing young people for life, to create harmonious and stable relations in different social groups - in the family, at work, in society. The educational area is realized in compulsory optional subjects: ethics education and religious education / religion.

The State educational program for primary and secondary schools of Slovak republic also defines several cross-educational themes, which explicitly declare principles of inclusive pedagogy in the description, such are: Multicultural education and Education and training of pupils from socially disadvantaged backgrounds

Cross-educational theme: Multicultural Education

With the current global society and the multicultural character of Slovak republic, dangerous prejudice and stereotypes, which are expressed in different forms of intolerance, racism and xenophobia can be noticed. Pupils are exposed to various daily cultural influences and getting in touch with members of different cultures. Through getting to know the other cultures, history, habits and traditions, pupils learn to respect these cultures as equivalent to their own culture and are able to communicate constructively and cooperatively. In the implementation of multicultural topic to the education it is recommended to use also teaching techniques and methods, which do not teach blurred intercultural differences, understand them, accept them and also respect human rights.

The cross-educational theme Multicultural education is closely linked to regional education and traditional folk culture, which is in its content more deeply engaged in a lively and valuable tangible and intangible cultural heritage of Slovakia. Getting to know own living region, its cultural and natural resources helps pupils to shape their historical consciousness. Suitable forms for application these topics are projects, field trips, themed walks in the region and so on. Regional Education and traditional folk culture can be carried out as part of school subjects - arts, music and ethics, history and geography or by elective courses such as regional education, regional history and the like.

Education is part of the regional and traditional culture.

The aim of the application of this cross-educational theme is to contribute to pupils:

- respect of the natural diversity of the society;
- recognition of various traditional cultures and new cultures and subcultures;
- acceptance cultural diversity as a social reality;
- understanding the own human rights and respect the human rights of others;
- have the opportunity to learn about national cultural heritage and develop cultural identity.

Cross-education theme: Education and training of pupils from socially disadvantaged backgrounds

Socially disadvantaged (unfavourable) environment is defined as environment that due to some social conditions (language, culture) does not provide sufficient conditions and appropriate stimuli

for the cognitive development of the child and does not support its effective socialization and personal development.

The aim of educating students from social disadvantaged backgrounds is to reduce or eliminate potential of handicaps resulting from this disadvantage in order to create the conditions for effective education and ensuring their equal access to standard education.

How best to mitigate unfavourable environment in school:

- adapt methods and practices in education in order to eliminate and compensate the restrictions caused by the pupil disadvantaging environment and use an individual approach;
- promptly solve educational problems, the use of an assistant teacher and other professionals is strongly recommended;
- motivate and create conditions for pupils and their parents for regular attendance at classes;
- prepare activities in which students can demonstrate and apply their personal very good or excellent skills;
- low the number of pupils in class.

Examples from school practice

Primary school in village Mojmirovce, Nitra region

Number of pupils in year 2011, when the school followed the project of inclusive education: 379.

Socio-economic status of school represents 13% of pupils from socially disadvantaged environment (Roma community).

The school attend 16 integrated pupils with mental disability.

All pupils declare Slovak nationality.

Child matured for school education by Mojmirovce school rules.

Physical maturity assesses a paediatrician by the confirmation. Mental development is seen in the child's speech. Pre-school child (6 years old child) should:

- clearly pronounce all the vowels,
- use full sentences (5-6 words),
- know the basic colours,
- identify days of the week,
- cope with the basic mathematical concepts (little, a lot, first, last, less ...)
- is oriented in space (up, down, behind, above, below ...)
- is able to concentrate to work,
- declaim rhymes, songs or poems.

Emotional and social maturity is reflected in the temporary separation of a child from the family. The child is able to spend a certain part of the day outside the family without evident emotional frustration. Child feels comfortable among other children and respects adult authority. Child is able to describe his/her feelings.

Working maturity is manifested so that the child is actively involved in different activities. Child is able to work alone or in the small group peacefully and is able to overcome obstacles. Child accomplishes the basic working and hygiene habits.

If a child, for various reasons does not fulfil these conditions, parents are advised to visit professional psychological examination at the Centre of Pedagogical and Psychological Counselling and Prevention in Nitra for establishing the proper diagnosis of the child's disabilities.

Project immiMATH team from Constantine the Philosopher University in Nitra is in contact with the school in Mojmírovce. We would like to cooperate with teachers and pupils and pilot project activities and ideas to help to deep development of inclusive education in this school.

Suggested topics

1. Integers
2. Fractions and Decimals
3. Graphs; reading and interpreting graphs
4. Percentages
5. Direct and Inverse Proportions
6. Linear functions
7. Financial mathematics
8. Propositional logic
9. The area and the perimeter of plane figures
10. The surface area and the volume of solid figures

2.3 Italy

The School "Amari-Roncalli-Ferrara" of Palermo (established September 1, 2012, following the sizing plan of the Sicilian school network and including the three school). The school is in the Oretotribunali-Castellamare district, rich in monuments and testimonies of past splendors. Once populated and inhabited, the district was gradually abandoned, first by the wealthy classes and later, with the construction of the "satellite neighborhoods", also from the popular classes. Since the 1990s a process of partial repopulation has begun on the part of the middle class bourgeoisie, thanks to the recovery of some magnificent buildings in the historic center.

In the various families there is respect for the family, for the elderly and for the school, recognized as a stable element in the territory, which has contributed to the growth of generations still present such as those of parents or grandparents and which often constituted a point reference for problems that are not only scholastic problems.

In the neighborhood, there are family units of migrants of different origins, including: Chinese, Moroccans, Tunisians, Nigerians, Senegalese, Romanians, Bengalis, some families of Roma, Sinti and walkers. In general, families of foreign origin show a relationship of collaboration with the school, transmitting to their children values of commitment and respect.

Given the varied articulation of the territory, the school implements a design aimed at the real needs of pupils and parents, looking for functional organizational solutions such as the different articulation of time modules.

Precisely in the recognition of the context as an element that contributes to growth and training, the school promotes the knowledge of its territory as a resource and the enhancement of cultural and monumental wealth present, in the belief that only by the full and conscious knowledge of its history can we arrive the formation of individual and group identities capable of opening up to confrontation with diversity, thus developing the values of civil coexistence.

The institute Amari_Roncalli_Ferrara has a population of about 800 students, distributed in three plexuses and three orders of school: infancy, primary and secondary degree I. There are many students with CNI (non-Italian citizenship) present in the three school orders, being our institute

located in an area with a strong immigration process. During the 2016-17 school year there was a general decrease in attendance compared to the previous year.

Every year the Ministry (MIUR) promotes projects related to "Areas at risk, with a strong immigration process and against school exclusion" (CCNL School subject 2006/2009, article 9) provide for the financing of school projects, of every order and degree, placed in risk areas and strong immigration process throughout the country. The Contract places the territorial situations in a single regulatory provision in relation to the socio-cultural context and economic hardship and brings the objectives of combating school exclusion back into a single conceptual framework.

The main objective is to address in a "synergistic" way the problem of scholastic dispersion and scholastic integration, setting up a series of initiatives of different nature: orientation and / or re-orientation activities, aggregative-socializing, recreational -recreational, strengthening motivation and skills, as well as awareness activities on issues related to discomfort aimed at families and teacher training activities.

According to the data for the month of November 2017, the presence of students with CNI present in our Institute it results to reach the totality of n.109, distributed according to the tables.

The Erasmus Plus "ImmiMATH" project has been included in the three-year plan of the school's educational offer.

The research work for this report was developed as:

- Search for data on the country of origin of pupils with CNIs distributed in the three school orders: infancy, primary and secondary (tables)
- Research on platforms, media, applications, mathematics soft on the network, in Italian, for immigrants. It was a complex job given the small amount of materials produced so far for ICT. The literature on paper is much more extensive.

3. Summary

Although the scope of migrant students in the classroom is different in the partner countries, and it widely varies within the countries and regions as well, the three partner countries show various initiatives in working on the education of migrant students. However, the focus of these initiatives lies mainly on general education and does not provide much input for subject-specific teaching. A review of various databases shows that although there are several international collaborations supporting education for migrant students, none of them offers support materials for mathematics teachers to increase motivation.

The project team consolidated the topics lists of national university-school pairs and – taking into consideration the results of the existing ICT analysis – decided on a final list of 12 topics. These topics were then distributed in such a way that each university-school-pair will develop 4 topics into learning software descriptions, 2 each for “motivation and learning” and “practice and assessment”:

Topic	To be developed by
Integers	Italy (D.3/D.7)
3-D Geometry	Italy (D.3/D.7)
Measurement	Italy (D.3/D.7)
Propositional logic	Italy (D.3/D.7)
Fractions	Slovakia (D.2/D.6)
Plane Geometry	Slovakia (D.2/D.6)
Financial mathematics	Slovakia (D.2/D.6)
Percentages	Slovakia (D.2/D.6)
Statistical Terminology	Austria (D.1/D.5)
Linear Functions	Austria (D.1/D.5)
Functions and Graphs	Austria (D.1/D.5)
Terms and Algebraic expressions	Austria (D.1/D.5)