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# Designing mathematical computer games for migrant students

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In recent years a high percentage of students are (first or second generation) immigrants not only due to the open labour market in the European Union. The current affairs regarding immigrants might indicate the future increment of this ratio. Lot of research has been conducted with the aim at influencing the formal education in the language which is not the mother tongue of students (e.g. Meyer, Prediger, César, & Norén, 2016). According to teachers experienced in working with immigrant-students, the materials suitable for students with a limited knowledge of the language of instruction should be based on symbolic and visual features and elements, implicitly using only a restricted amount of text elements (Kijáčová, 2018).

Other crucial factors influencing the school performance are the different personal cultures of immigrant-students. The contexts of problems are suitable when they are part of students' everyday life, familiar to the learner, up to date, and do not focus too much on any social issues (Rossouw, Hacker, & de Vries, 2011). Intercultural teaching materials can be beneficial for all students, not only for immigrants. Materials should be built on the culture-related context, respecting the background of every individual student.

The educational computer games have the potential to motivate students to learn mathematics (Papastergiou, 2009), hopefully also under difficult circumstances. Despite of it that there are plenty of electronic materials available for mathematics classrooms, however, there is only a limited amount developed for multicultural learning situations, especially for the specific situation of immigrant-students.

The main aim of this poster is to promote the project **Innovative Mathematics Learning Software for Migrant Students – immiMATH** supported by the Erasmus+ programme and to describe the principles leading the design of the educational software for a specific group of students.

**Principle 1:** Designed software should **minimize the amount of text**.

**Principle 2:** Designed software should **relate to the everyday life** of students.

**Principle 3:** Dividing into levels should allow students to **monitor their progress**.

Two kinds of games were designed (see Table 1): (i) motivational games showing students the role of mathematics in their everyday life; (ii) games for revising the acquired knowledge in the manner decreasing the anxiety and increasing students' self-confidence in solving mathematics tasks. The project team consists of university teachers (mathematics teacher educators), school teachers and software-company experts experienced in designing educational software. The designed software will be evaluated by project partners and piloted in selected schools. Each piece of software will be tested twice. The software will be adjusted according to the first pilot trial that will be carried out with future mathematics teachers with special focus on migrant students. The second version will be

piloted by regular students, including immigrant-students. The second objective of the project is to provide professional development activities for both, pre-service and in-service teachers, regarding the multicultural education and presenting all attributes of the designed learning software.

| Software for motivation   |                         |         | Software for practice    |                      |         |
|---------------------------|-------------------------|---------|--------------------------|----------------------|---------|
| Name                      | Topic                   | Grade   | Name                     | Topic                | Grade   |
| Trip through Europe       | Linear Functions        | 9 to 10 | Journey around the World | Linear Functions     | 9 to 10 |
| The Algebraic Garden      | Algebraic Expressions   | 8 to 10 | Penny Bank               | Financial Literacy   | 4 to 6  |
| Save Europe!              | Percentage              | 8 to 11 | Geometria Land           | Planimetry           | 9 to 11 |
| The Math Princess' Tower  | Number Sense (Integers) | 4 to 5  | The Little Architect     | Spatial Geometry     | 4 to 6  |
| Multicultural Logic Train | Logic                   | 4 to 6  | Building a city          | Functions and Graphs | 9 to 11 |
| Deli Shop                 | Fractions               | 4 to 8  | Birthday Party           | Measurements         | 4 to 6  |

**Table 1: List of the designed software**

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