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LEARNING MATHEMATICS THROUGH NEW COMMUNICATION FACTORS

European Project Le-MATH:
Learning mathematics through new communication factors,
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Unfortunately, many pupils as well as parents consider mathematics to be a difficult and boring subject. Instead of studying mathematics (or other subjects) many students prefer to spend most of their time by watching TV, playing video games or on their mobile devices sending texts, pictures and videos. One way to bring pupils back to the "playing field" of education is to employ the use of similar tools (weapons) like the "opponents", in order to communicate the learning of mathematics in a non-traditional way, like a game through theatre or competitions similar to the well-known X-Factor and other. The Le-Math project, funded by the European Commission and coordinated by the Cypriot Mathematical Academy with 12 participating partners, undertook the creation of these tools, in the period from November 2012 until its completion in October 2014. In this publication we will present the results of the first year of the project.

*Coordinating Organization of the project is the Cyprus Mathematical Society (CY-Gr. Makrides, A. Philippou, C. Papayiannis) along with 12 partners from Cyprus, Greece, Bulgaria, Romania, Austria, Sweden, France, Spain, Czech Republic, Belgium and Hungary. The cooperating bodies are Thales Foundation of Cyprus (CY-A. Skotinos, P. kenderov, E. Christou), Charles University in Prague-Faculty of Education (CZ-J. Novotna, A. Jancarik, K. Jancarikova, J. Machalikova), Loidl-Art (AT-H. Loidl), VUZF University (BG-S. Grozdev), "CALISTRAT HOGAS" National College Piatra-Neamt (RO-N. Circu, L-M Filimon), Lyckeskolan (SE-M. Manfjard Lydell), LEOLAB (ES-M. Munoz), Junior Mathematical Society Miskolc(HU-P. Kortesi), European Office of Cyprus (BE-CY-R. Strevinioti), Collège Saint Charles (FR-K. Treguer, E. Gueguen), National Technical University of Athens, Institute of Communication and Computer Systems (GR-K. Karpouzis), Com2go Ltd (CY-G. Economides, N. Nirou).

1. Introduction. Many students claim that mathematics is often too abstract and therefore difficult to understand. As a result, this project aims to use different and innovative approaches by inviting teachers and pupils together to apply new communication methods in the learning of mathematics, which could be fun and enjoyable at the same time. An approach, that brings new ideas in the context of "learning through play."

This European project intends to develop a new methodology for the learning and teaching of mathematics to students aged between 9 and 18, which subsequently can be used in any school environment. It will also make learning more attractive and enjoyable for all students and it will strengthen their skills for creative thinking. These methods could be used in other subjects of the education curricula, as well as for other age groups.

The consortium comprises partners from universities, schools, mathematics associations, foundations, theatre schools, art schools and enterprises.

The project activities contribute to the Education and Training 2020 as it is enhancing creativity and innovation among youth. It also contributes to the benchmark for decreasing low-achievers in basic skills (mathematics and science) to 15%. It promotes the European Cooperation on schools in fundamental aptitudes, by supporting the key competence for mathematics.

2. Objective. The aim of this project is the development of a methodology in the teaching and learning of mathematics, with the creation of two main tools that can be used by teachers. The methods will be created in such a way so that they can be used in an in-service training course for teachers who teach mathematics to pupils of age 9-18.

The two methods are:

A. MATHeatre: Teaching and learning mathematics through math theatre activities

B. MATH-Factor: Teaching and learning mathematics through mathematics communication activities

These methods are expected to be able to compete with the interests and the activities of the students belonging in the aforementioned age group. The project is being developed through nine work packages. Below follows a description of some of them.

3. Good Practices in the European Space. In this work package we collected practices relevant to the subject and we developed them in an e-book. In this manual one can find current or past activities. The final version of the manual can be found on the website of the project `www.le-math.eu`.

4. MATHeatre. The Math Theatre follows the same rules of a normal theatrical play, but with the play directly related to maths and with the actors being students between the age 9 and 18. It can have all the forms that characterize theatrical plays such as drama, comedy, musical etc. and the central plot can be based in any mathematics related subject from the school curriculum or in the history of mathematics. The difficulty of this activity lies in the fact that the dialogues of the actor-students must pass complete mathematical knowledge to the audience.

The first edition of the instruction manual "MATHeatre Guidebook", which was published on September 2013, contains a description of the procedure as well as samples of theatrical plays that can be used in the school environment. A competition was launched through the project, for the writing of such plays. Samples are published on the website of the project. Furthermore, the project published for guidance purposes, a manual titled "Mathematical Stories for Theatre".

During the second year of the project, a European competition with international

participation, titled MATHeatre EUROPE 2014 was launched. Schools, organizations or groups of students are eligible to participate, by preparing a play of a total duration of 5-12 minutes, with 2-10 participating actors. During the first phase of the competition (Sept. 2013-Feb. 2014), the participants will have to upload their theatrical play on YouTube through a special designed platform. After the first evaluation process the five best participants of two different age groups (9-13 and 14-18) will be invited for the finals that will be held during the EUROMATH student conference on the 24-28 of April 2014.

The evaluation criteria of the math theatre are included in the relevant instruction manual in two different forms; one for activities within the school premises and the other for open public competitions like MATHeatre Europe 2014.

5. MATHFactor. The MATHFactor is an individual activity of communication related to mathematics, in the sense that a student will have to prepare and explain within 3 minutes mathematical concepts, theorems, applications, or aspects of the history of mathematics etc., in a simplified manner in order to be understood by non-experts or students. During the presentation the use of interactive projection tools and the blackboard is not permitted, but the student may use small objects that can be carried in one hand.

A good presentation will be evaluated based on the high articulation of the participant and his/hers ability to impart knowledge to the audience, the presentation of mathematical concepts, for its content, its innovation and approach.

The whole approach it is based on the well-known TV game X-Factor, but it is centered on mathematics instead of singing. This method could be used as an educational activity within the classroom and/or in open public competitions.

During the second year of the project, a European competition open to international participation, titled MATHFactor EUROPE 2014 was launched, in which students are invited to participate with a presentation of maximum duration of 3 minutes. During the first phase of the competition (Sept. 2013–Feb. 2014), the participants will have to upload their presentations on YouTube through a special designed platform. After the first evaluation process the five best participants of two different age groups (9–13 and 14–18) will be invited to the finals that will be held during the EUROMATH student conference on the 24-28 of April 2014.

The evaluation criteria of the communication of mathematics, in a MATHFactor fashion, are included in the relevant instruction manual in two different forms; one for activities within the school premises and the other in the case of open public competitions.

6. Experimentation and Evaluation. The experimentation and evaluation process will take place in different phases and levels.

MATHeatre EUROPE 2014

MATHFactor EUROPE 2014

The whole effort will be based on an international level competition. Participants will be divided into two different age groups (9-13 and 14-18), in order to better serve the overall aim of the project and in order to give the necessary incentives and spark the interest of both students and teachers. The first phase of the competition opened on September 2013 and closes on February 7, 2014, with the participation possible via online submissions. After evaluating all entries the finalists will be invited to participate to the live grand finals which will take place during EUROMATH 2014.

During this process, the involvement and the activities of the students will be eval-

uated, as well as the role and the impressions of the teachers that supported the effort. Additionally, their comments and remarks regarding the instruction handbooks will be taken into account.

The finals will also be assessed and the results of the evaluation will be used for future reference, in order to improve the process in general and to ensure its sustainability. Additionally, the results will be used for improving the instruction manuals for both the MATHFactor and the MATHTeatre.

An important part of the project's sustainability is also the creation of a five-day training programme for teachers, which will be offered as a training course open for participation through funding provided by the LLP National Agencies of the European countries.

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ИЗУЧАВАНЕ НА МАТЕМАТИКА С НОВИ КОМУНИКАЦИОННИ СРЕДСТВА

Грегори Макридес, Сава Иванов Гроздев и партньори

Голям брой ученици, както и родители, за съжаление смятат, че математиката е труден и скучен предмет. Вместо да учат по математика (и по други предмети) много ученици предпочитат да прекарват по-голямата част от времето си, като гледат телевизионни програми, играят на видео игри или изпращат с мобилните си телефони текстове, рисунки и клипове. Един от начините учениците да бъдат върнати на „игралното поле“ на образованието е да се използват подобни инструменти (оръжия) като тези на „опонентите“, с цел да се комуникира ученето на математика по нетрадиционен начин, като игра на театър или състезания от рода на добре известното Х-Фактор и други. Проектът Le-Math, финансиран от Европейския съюз и координиран от Кипърската Математическа Академия с 12 участващи партньора, се зае със създаването на тези инструменти в периода от м. ноември 2012 г. до завършването му през м. октомври 2014 г. В тази статия се представят резултатите от първата година на проекта.