RbtsInMath: Developing Mathematics Achievement through Using Robotics Applications in Flipped Learning

Pilot Study of Modular Curriculum

REPORT

University of Latvia

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CONTEXT

Grant agreement	2022-1-PL01-KA220-HED-000086524
Programme	Erasmus+
Action	Cooperation partnerships in higher education
Project acronym	RbtsInMath
Project title	Developing Mathematics Achievement through Using Robotics Applications in Flipped Learning
Project starting date	01/11/2022
Project duration	28 months
Project end date	28/02/2025

Table of content

Modular Course Curriculum Pilot Study Report

Partner's Name: University of Latvia

Date: 22 June 2023 and 15 September 2023

Place: Branch Tukums of University of Latvia and Faculty of Education, Psychology and Arts of University of Latvia

Aim

The aim of the piloting was to familiarize participants with the main principles of the RbtsInMath project and to introduce them the Modular Curriculum.

Introduction to the Piloting

The piloting of Modular Curriculum at University of Latvia have implemented at June 22 2023 and September 15 2023. The pilot study was designed to give opportunity for participants get to know the main principles of the RbtsInMath project (Developing Mathematics Achievement through Using Robotics Applications in Flipped Learning, 2022-1-PL01-KA220-HED-000086524) and to introduce them the Modular Curriculum. Modeling of Modular Curriculum was held in two different ways:

- as distant process on MSTeams platform 8 lesson hours between 09:00 am - 15:00 pm for Part time prospective students in branch Tukums of UL
- as face-to-face process 8 lesson hours between 10:00 am - 16:00 pm for Full time prospective students in Faculty of Education , Psychology and Arts of UL.

The University of Latvia has 8 branches where prospective teachers study in the bachelor's level study programme Primary Education Teacher. Since the Covid pandemic, the study process can be carried out remotely according to the Cabinet of Ministers' regulations. For this reason, the modelling of the project materials was carried out remotely in the Tukums branch on the MSTeams platform. On 22 June 2023, 22 part-time prospective teachers participated in the modelling sessions. In turn, 20 prospective teachers participated in the modelling of the face-to-face classes at the Faculty Education, Psychology and Arts of UL.

Profile of Participants

A total of 42 pre-service teachers (22 part time students and 20 full time students; 42 female and 0 male) studying at University of Latvia participated in the Modular Curriculum Pilot Application. The participants were part time students of the Faculty of Education, Psychology and Arts.

Overview of the Piloting

The course students met in 8-hours training sessions on MS Teams platform and face-to-face. Piloting of main ideas and statements from all modules was implemented and practically work out in two different groups of prospective students: 1st modeling session were on MS Teams for part time students in Tukums Branch and 2nd modelling session were face-to-face design for full-time students. The course objectives were based on objectives of the Project Curriculum which was developed by the project team as part of the Intellectual Output 1, including the Knowledge Paper. Project researcher Dr. Ineta Helmane designed and delivered the course for prospective teachers in University of Latvia.

Within the framework of flipped learning, students have accessed learning materials and resources to familiarise themselves with the content and main issues prior to lectures on the MS Teams platform. Prospective teachers have had the opportunity to use the project materials, including the videos of lessons from the Project Webpage, as well as the knowledge paper and additional papers proposed by the professor. The project curriculum consisted of ten modules:

Module 1: Learning theories

Module 2: Maths anxiety

Module 3: The history of robotics applications in education

Module 4: Learning math as a game

Module 5: The use of robotics in mathematics education in primary schools

Module 6: Flipped learning and its practices in primary schools

Module 7: Teaching flipped learning and its practices in higher education institutions

Module 8: How to use robotics to teach mathematics in primary schools

Module 9: Development of computational thinking

Module 10: Coding and robotics to improve math learning

Pre-service teachers analyzed main ideas presented in modeling sessions. They were also required to read theoretical materials related to the project content to gain a better understanding of the theoretical background. No changes in content were made. I.Helmane presented main scientifically improved findings on anxiety as well as mathematics anxiety. The positive examples of use of robotics in mathematics education were shown and discussed with participants. During the training sessions, prospective teachers were able to comprehend the main concepts, theories, research methods, and results of the course content. Students had the opportunity to work in groups, discuss, analyze, describe, and present the course content. Trainee teachers used various methods to demonstrate their in-depth understanding and personal views on the use of robotics education to reduce mathematics anxiety in mathematics teaching. In modeling sessions, prospective teachers were asked to reflect on and list the main issues related to using robotics education in teaching mathematics, with the aim of reducing mathematics anxiety. They were also asked to design concept maps, create posters, and develop activities related to this topic. At the end of the training program, students received a digital certificate.

Feedback and Evaluation

Prospective teachers reported that the pilot study allowed them to observe, realize, and experience the benefits of using robotics in math education. Specifically, they found that it reduces mathematics anxiety, makes lessons more enjoyable for students, and helps students develop positive emotional attitudes towards mathematics. The prospective teachers argued that there are advantages and disadvantages to using robotics in maths education in primary school.

Additionally, information was provided regarding the project's social media accounts and webpage to enable participants to access project-related information and activities. To evaluate the pilot study, a semi-structured interview was administered at the end of the study

to gather participants' opinions. Below are some of the responses to the questionnaire (see Figure 1):

I appreciate group work.

It was very valuable to compare our own and others' experiences.

Very interesting insight into the project.

I am looking forward to applying the results of the project in real life.
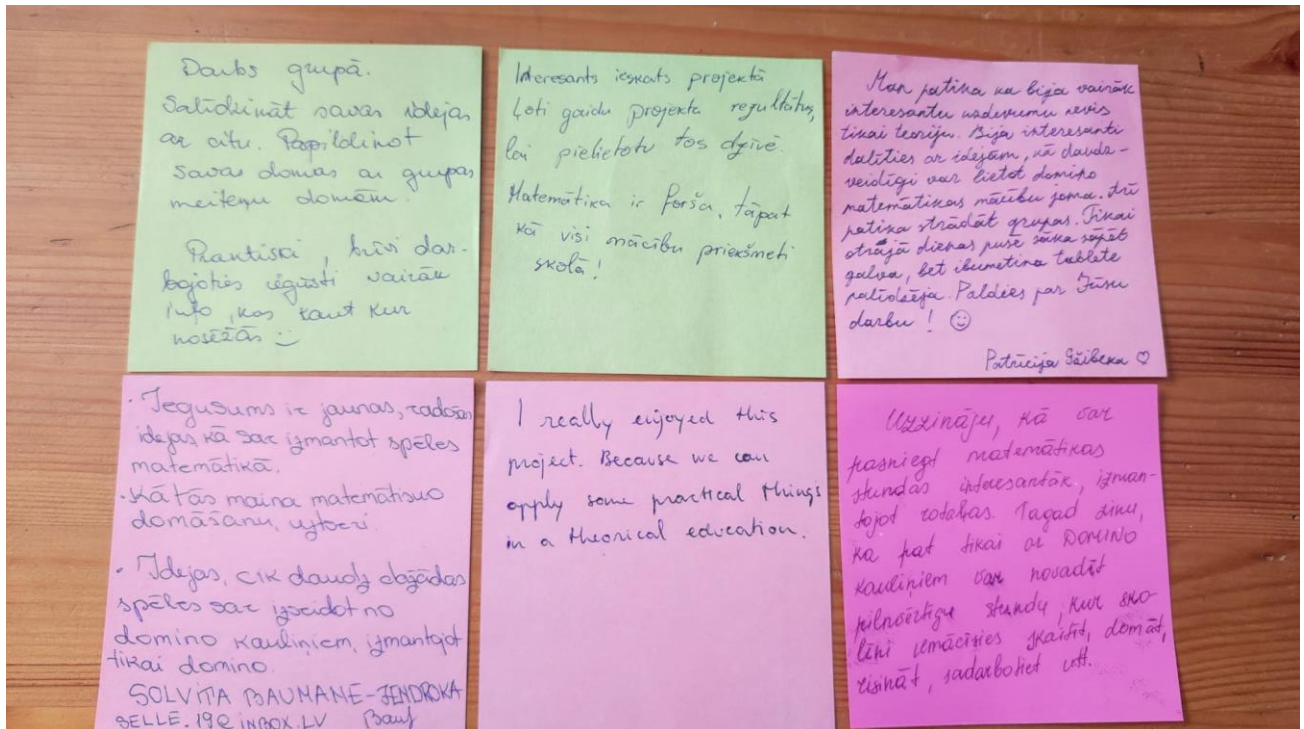

Figure 1. Prospective-teachers evaluation of modelling sessions.

Participants of modelling sessions were generally positive about the information about the planning of the pilot study.

Prospective teachers appreciate the opportunity to participate in the Developing Mathematics Achievement through Using Robotics Applications in Flipped Learning project. They gain experience in enriching math lessons with educational robotics and reducing math anxiety. The suggestion was made to design and implement in-service training sessions for teachers and pre-service training sessions for other groups of students.

Appendices

Appendix 1 – Signed and stamped list of participants

Uploaded in folder on Adminproject platform

Appendix 2 – Signed and stamped Certificates

Uploaded in folder on Adminproject platform

Appendix 3 - Photographs or Screenshots

Uploaded in folder on Adminproject platform