Department of Mathematics at the Pedagogical University of Cracow is continuously involved in innovative training programs for teachers at SE level and also directly for school students. The Chairs of Education of Mathematics and Foundations of Mathematics are recognized leaders in education of mathematics in Poland, Europe and beyond.

The Department has run recently two medium size projects for school students at age of 12-18:

“Exploratory of Creative Mathematics”, grant NCBiRWND-POWR.03.01.00-00-U126/17-01, total 485 538, 24 PLN (ca. 115 000 EUR), 2018-2020

„Laboratory of Creative Mathematics”, grant NCBiR WND-POWR.03.01.00-00-C008/16-04, total 214 150,30 PLN (ca. 55 000 EUR), 2017-2019

It is also part of several Erasmus+ projects including ongoing projects:

STEAME 2019-1-CY01-KA201-058240

INNOMATH 2019-1-DE03-KA201- 059604

STEAME GOES HYBRID 2020-1-CY01-KA226-SCH-082675

The department has s group of researchers lead by Dr. Daniel Wójcik developing the project “good questions” devoted to the study of impact of new technologies on the work in a class room. It makes intensive use of smartphone installed applications of which Wolfram Alpha as a symbolic algebra and visualization program and Pingo (https://pingo.coactum.de/) as a program to quick anonym quizzes during a class play a pivotal role. The overall idea is to bring teaching to the environment the students feel comfortable in (smartphones) and use technology which exceeds in accessibility and computation power what would be available in a traditional computer lab. This project focuses on implementing the peer instruction teaching method in a sophisticated technology environment. As such, it presents an ideal testing ground for hybrid and/or distance learning.

The department has also a unit experienced in preparing videos promoting the department, events organized by the department and addressing general issues of students. This unit has equipment and knowledge which combined with the appropriate methodological and teaching concepts can contribute in a key way to the current proposal.

The key person, prof. Tomasz Szemberg is a recognized researcher in algebraic geometry (more than 85 research articles in top journals) and simultaneously a devoted mathematics educator. His activities in the field of Education focus on tools for improving teaching and learning, which includes use of mathematics motivated games at various stages of education. He coordinated two national projects devoted to new teaching techniques and classroom activity focused teaching. The last one completed in the Autumn of 2019 involved more than 500 students and more than 100 mathematics or sciences teachers in the region of Cracow. He authored two books (in Polish: Koktajl Matematyczny and Konfiguracje Prostych i Stożkowych) on popularization of mathematics. Over the last 20 years he has developed and implemented in various environments a quite unique concept of teaching mathematics through involving students in active research and focusing on presenting their results in a written form.

Dr. Daniel Wójcik is a researcher working directly in Math Education and an active high school teacher. The high value of asking good questions in mathematical classroom is well known and recognized for centuries. There is however no general consensus about how teachers implement question-asking. Rapid developments of the electronic era provide new possibilities and tools. Mr Wójcik conducts his research on the subject of Good Questions. This term has been first coined in teaching physics at the university level. Mr Wójcik has discovered the method and adapted it to teaching mathematics. The idea, roughly, is to ask a series of questions at the beginning of the class meeting. This questions are answered by students on their smartphones and the results are immediately available on a screen. This is a starting point of an open discussion. An important feature of the method is that the answers at the beginning are delivered in an anonymous way, so the fair of being wrong drops. The questions are so constructed that they lead to creative discussions within the classroom.

Our team will combine efforts with the Department of Arts, whose representative Dr. Agnieszka Kamrowska has considerable experience in augmented and virtual reality projects.