

Report on MeJ Makers 2024 Summer School

Teacher training - Informatics tools in STEAM education and Makers pedagogy - Introduction activity

24-29 August 2024

Erasmus+ KA210 Small-scale partnerships in school education project **MeJ Makers**.
2023-2-FR01-KA210-SCH-000176068

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Introduction and context

The main expected outcome of MeJ Makers project is to have a STE(A)M course included in both partner schools curriculum - namely the maths research workshops - with an approach that engages students, fosters curiosity, and provides opportunities for digital learning.

This teacher training activity is chronologically the first activity planned in the MeJ Makers project, and one of the two activities targeting teachers to support them in introducing makers pedagogy, digital tools, technology and engineering to the maths research workshop for students.

It has been held as scheduled during the last week of August 2024, from 25 to 29 August, in Cluj Napoca in the premises of the Colegiul Național Emil Racoviță that is one of the partners of the project, and organised by Informatiques.fr, another partner of the project.

Program and content

This activity has been a 4.5 days long on-site course for the mathematics and sciences teachers involved in the project.

In this face-to-face training activity, two Informatiques.fr experts introduced the generic approach of STEAM education, maker thinking and experimental mathematics - to be developed in MeJ -, and tried to transfer their experience and know-how of the related digital and pedagogical tools.

During the first session the experts have provided an overview and engaged in a discussion about the exact nature of STEAM education and the pedagogy associated with “making”. Potential advantages for high school students have been explored as well as strategies for integrating these approaches into their curriculum. Then, they have addressed during these 4.5 days the concepts involved in the activities of experimentation, analysis, understanding, modeling, simulation, and spreading. It has been done in a workshop-style methodology coupling presentation and discussion on theoretical point of view, with introduction of the relevant methods and tools (symbolic computation, numerical processes, 3D computational geometry, computer-aided design, additive and subtractive fabrication).

In terms of contents the scheduled program has been followed :

1. STEAM approach & Maker Pedagogy

Introduction to digital tools (Python, JavaScript, C++, FreeCAD, Mathematica)

2. “Calculating with or without numbers”
 - Representation of numbers
 - Precision, accuracy, orders of magnitude and uncertainty
 - Symbolic calculations
 - Simplicity and equality of expressions
 - Algorithms vs. know-how
3. “A good sketch is better than a long speech”
 - Graphic language, directives and primitives
 - The “turtle” robot
 - Geometric calculation
 - Algorithmic geometry
 - Visualising infinity
4. Modelling and Simulation
 - State, evolution and control
 - Temporal and spatial discretization
 - Random generators
 - Generation methods
5. Imagine, design and manufacturing
 - The CAD software model
 - 3D printing, layer by layer
 - Additive manufacturing
 - Subtractive manufacturing

Another objective of this activity was the exchange of ideas, of experiences, and of cross-cultural practices among teachers. To go further with this objectives, it has been insured that participants where together not only during workshop times but also for cultural visits, lunch and dinners, namely :

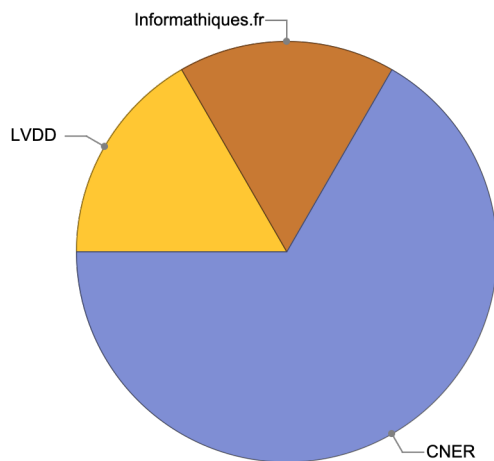
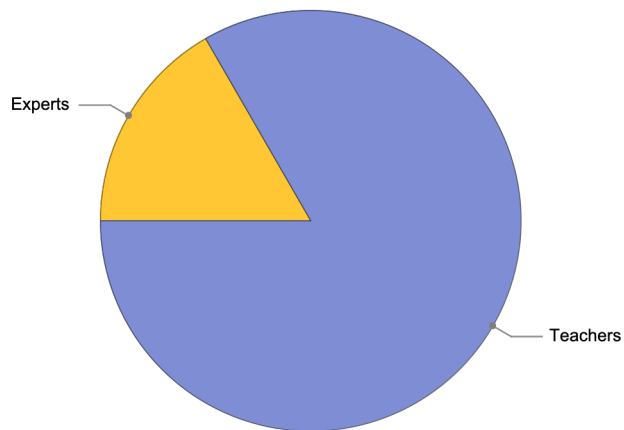
- a guided tour of the city of Cluj
- a visit of the botanical garden
- a walk to Cetățuia and along the Someș River

Further technical informations et course support are available from <https://mejmakers.informatiques.fr/activity1.html>

Participation

12 participants have been following this activity, 2 experts and 10 teachers, 2 from Lycée Val de Durance, 2 from Informatiques.fr, 8 from Colegiul Național Emil Racoviță.

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Evaluation

An evaluation form has been anonymously submitted to the participants (except the 2 experts organising the workshop) with the following questions :

evaluation form

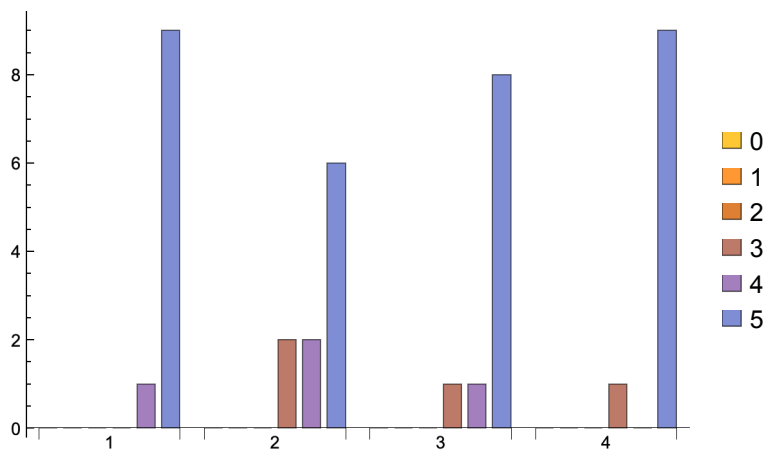
This activity was intended to introduce foundation of the concepts of experimentation, analysis, understanding, modeling, simulation, and spreading as used by STEAM education and Makers thinking.

1. From this point of view, how would you rate the content of this training activity ?
(0 - poor to 5 - excellent)

2. Do you think it will help you to design engaging and effective learning experiences for your students ?
(0 - absolutely no to 5 - definitely yes)
3. During this activity, did you had the opportunity to share and exchange ideas, experiences, materials, and cross-cultural practices with other involved teachers and with the experts ?
(0 - absolutely no to 5 - definitely yes)
4. How would you rate the people animating and teaching during this training activity ?
(0 - poor to 5 - excellent)
5. Please provide any suggestion you may have for the continuation of our ongoing project...

evaluation outcomes

Results of the form are summarized below that shows a good feedback on this activity.



Suggestions were reflecting that the amount of information given in a week was probably a little bit too big compared to the practical work that have been done : “Start with a very slow level”, “It might be helpful to do more than talking about”, “Now, it’s time to practice”, “I propose more time to deepen the information received”

Conclusion

The “Teacher training - Informatics tools in STEAM education and Makers pedagogy - Introduction” activity reached its objectives as well in terms of transfer of knowledge and know-how as in terms of experiences sharing and ideas exchange.

The participants that were a little bit more numerous than expected (12 vs. 10) were enthusiastic, at the end of the week, in introducing STEAM pedagogy and digital tools in their activities.

We were all happy to have met and exchange together, and were satisfied of the good time we had during the week.

I am quite confident that this introduction has been a very informative and motivating step for the rest of our project.