STEAMTeach

Science | Technology | Engineering | Arts | Mathematics

STUDENT-GENERATED MICROGAMES

STEAMTEACH AUSTRIA PDF

PROJECT

PROJECT ACRONYM	STEAMTeach
PROJECT TITLE	STEAM Education for Teaching Professionalism
PROJECT REFERENCE	2020-1-ES01-KA201-082102
START DATE	1st October 2020
KEY ACTION	Cooperation for innovation and the exchange of good practices
ACTION TYPE	Strategic Partnerships for school education
PROJECT WEBSITE	https://www.steamteach.unican.es/

REPORT DETAILS

VERSION	Draft
DATE	15.11.2021
MAIN AUTHORS' NAME AND EMAIL ADDRESS	Imam Fitri Rahmadi (imam.rahmadi@jku.at) Tony Houghton (ajh249@gmail.com)
CONTRIBUTING INSTITUTIONS	Johannes Kepler Universität Linz
REVIEWED BY	
STATUS	

TABLE OF CONTENTS

1 PROJECT JUSTIFICATION

Educational games enable students to learn in more meaningful manners. Those games may offer a rich field for a risk-free, active exploration of serious intellectual and social problems (Abt, 1970: 13). Furthermore, serious games could provide users with fun and meaningful experiences reaching up to the emotional level as well as offer immediate feedback and adaptability (Dörner et al., 2016). Games can be integrated for supporting learning in two different ways, to play games or to create games (Rieber et al., 2009; Siko & Barbour, 2012). The first strategy is by far the most common ones. Teachers use games for teaching while students playing games for the means of learning. Creating games as media for learning and instruction is the more advance level and this looks potential to support integrated learning such as for science, technology, engineering, arts and mathematics (STEAM) education. Games act as the arts to bridge connection among other STEM subjects (G.A.STEM, 2019). By developing games, students learn interdisciplinary about science, technology, engineering, arts and mathematics.

Developing educational microgames – very short and small games, instead of games in general, appears to be more suitable for school curriculum and resources. The present activity promotes students and teachers to be able to develop microgames on the GeoGebra platform. The activity could empower them to explore arts in connection to science, technology, engineering, and mathematics. Students and teachers could start expressing their creativity by designing a very short and small game with mathematical contents. This process is followed by constructing the design on GeoGebra so that they can apply science, technology, and engineering during the game developments. The process of designing and developing microgames can be done individually or in collaboration with peers. They may also share the created games to their peers for testing.

Co-funded by the Erasmus+ Programme of the European Union

This project has been funded by the ERASMUS+ programme of the European Union under grant no. 2020-1-ES01-KA201-082102

1.1 Project Overview

Participant age: 15 - 45	***No. of participants:*** Groups of 3 - 5	***Duration:*** 5 hours
Level of knowledge: Basic of GeoGebra, computer, and programming	***No. of teachers:*** 2 - 3	***Type of venue:*** Regular classroom Computer laboratory
Learning methodologies: Project-based learning Collaborative learning	***Involved disciplines:*** Science Technology Engineering Arts Mathematics	***Technological needs:*** Paper and pencil Computer Internet
Most emphasised learning methodology: Project-based learning Collaborative learning	***Main addressed topics:*** Mathematical games	***Estimated project cost:*** 500 €

2 CURRICULAR CONTEXT

2.1 Key competences

The present activity develops students and teachers competences on digital literacy and STEAM.

2.2 Content

The content of this activity is described in the following table.

DISCIPLINE	CURRICULAR CONTENT ADDRESSED
Science	Proof of game concept
Technology	Computer and programming
Engineering	Coding and programming
Arts	Design and visualisation
Mathematics	Mathematical contents

Co-funded by the Erasmus+ Programme of the European Union

This project has been funded by the ERASMUS+ programme of the European Union under grant no. 2020-1-ES01-KA201-082102

2.3 Expected learning results

Students and teachers are expected to learn arts that are integrated with science, technology, engineering, and mathematics (STEM).

3 STEPS TO BE EXECUTED

3.1 Step 1: Identify a unique challenge or problem

Duration: 30 minutes

Identifying mathematical concepts or problems for microgames content

3.2 Step 2: Investigate the challenge using the inquiry process & apply ideas

Duration: 30 minutes

Designing a microgame with paper and pencil as the basic concept

3.3 Step 3: Explore the ideas through collaborative activities

Duration: 2 hours

Developing the microgame design on GeoGebra

3.4 Step 4: Utilize the inquiry process to refine products

Duration: 30 minutes

Testing and refining the created microgames

3.5 Step 5: Develop the summative product and share publically

Duration: 30 minutes

Developing the final version of microgames and share it to their peers

4 PROJECT EVALUATION

At the end of the activity, students and teachers are asked to fill out a questionnaire about their experiences in integrated teaching and learning by developing microgames.

Co-funded by the Erasmus+ Programme of the European Union

This project has been funded by the ERASMUS+ programme of the European Union under grant no. 2020-1-ES01-KA201-082102

5 MATERIALS AND ROOMS

The activity would need papers, pencils, and computers with good Internet connection.

6 INSTRUCTIONS ABOUT THE CONSTRUCTION OF PROTOTYPE/SOFTWARE/OTHER

Learning resources for this activity would be provided on a GeoGebra book.

7 CONCLUSIONS

The activity has been planed and would be evaluated after the training.

References

Abt, C. C. (1970). *Serious Games*. Viking.

Diego-Mantecón, J., Blanco, T., Ortiz-Laso, Z., & Lavicza, Z. (2021). STEAM projects with KIKS format for developing key competences. [Proyectos STEAM con formato KIKS para el desarrollo de competencias clave]. *Comunicar, 66*, 33-43. https://doi.org/10.3916/C66-2021-03

G.A.STEM. (2019). *Enhancing STEM Skills through Arts and Mini-games*. University of Turku.

Mildner, P., & 'Floyd' Mueller, F. (2016). Design of Serious Games. In R. Dörner, S. Göbel, W. Effelsberg, & J. Wiemeyer (Eds.), *Serious Games* (pp. 57–82). Springer International Publishing. https://doi.org/10.1007/978-3-319-40612-1_3

Rahmadi, I. F., Lavicza, Z., & Houghton, T. (2021). Defining Microgames in Education Context. *International Journal of Emerging Technologies in Learning (IJET) - in Press*.

Rahmadi, I. F., Lavicza, Z., & Houghton, T. (2021). Towards User-generated Microgames for Supporting Learning: An Investigative Exploration. *Contemporary Educational Technology*, *13*(3), 1–16. https://doi.org/10.30935/cedtech/10785

Co-funded by the Erasmus+ Programme of the European Union

This project has been funded by the ERASMUS+ programme of the European Union under grant no. 2020-1-ES01-KA201-082102

Rahmadi, I. F., Lavicza, Z., Arkün Kocadere, S., Houghton, T., & Hohenwarter, M. (2021). The strengths and weaknesses of user-generated microgames for assisting learning. *Education and Information Technologies*. https://doi.org/10.1007/s10639-021-10635-8

Rieber, L., Barbour, M., Thomas, G., & Rauscher, D. (2009). Learning by Designing Homemade PowerPoint Games. In C. T. Miller (Ed.), *Games: Purpose and Potential in Education* (pp. 23–42). Springer US. https://doi.org/10.1007/978-0-387-09775-6_2

Siko, J. P., & Barbour, M. K. (2012). Homemade PowerPoint Games: Game Design Pedagogy Aligned to the TPACK Framework. *Computers in the Schools*, *29*(4), 339–354. https://doi.org/10.1080/07380569.2012.734430

Co-funded by the Erasmus+ Programme of the European Union

This project has been funded by the ERASMUS+ programme of the European Union under grant no. 2020-1-ES01-KA201-082102