Key Action: Cooperation for innovation and the exchange of good practices
Action Type: Strategic Partnerships for school education

Project Title

Advancing programming, STEM and IoT understanding in the classroom through DIY computer kits

Project Coordinator

Organisation	ECAM-EPMI
Address	13 Boulevard de l'Hautil , 95092 Cergy Pontoise , Île de France , FR
Website	www.ecam-epmi.fr

Project Information

Identifier	2019-1-FR01-KA201-062281
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EC Contribution	283,987 EUR
Partners	Colegiul National Pedagogic "Mircea Scarlat" (RO) , M.K. INNOVATIONS LTD (CY) , DANMAR COMPUTERS SP ZOO (PL) , PROJETO SCHOLE LDA (PT) , ASSERTED KNOWLEDGE OMORRYTHMOS ETAIREIA (EL)
Topics	ICT - new technologies - digital competences ; New innovative curricula/educational methods/development of training courses ; Pedagogy and didactics

Project Summary

CONTEXT
Children today are born into technology and using it comes natural them. However, there is a need for them to acquire technological skills, such as programming. STEM skilled labour force is in high-demand in Europe and demand will continue to increase due to the advent of Industry 4.0 and Advanced Manufacturing Technologies. It is estimated that the EU will have up to 825.000 ICT job vacancies by 2020 due to shortage of skilled labour force. Basic coding skills are needed, as more than 90% of today's professional occupations do require digital competences, including programming. New ways of engaging children into programming and STEM are needed but more screen time is not the best approach. Hands-on play is more fun and many times more educational. The bridging of the online and the offline worlds may offer a more engaging and healthy environment for children to learn how to program and develop STEM skills.

OBJECTIVE
STEMKIT4Schools has as primary objective to produce approaches and tools to help those working with children reach out to them with a view to help them engage with programming and develop STEM related skills. It aims to achieve this not by increasing screen time but by encouraging hands-on play through the creation of games playable on a retro design DIY wooden computer in combination with electronics gadgets relating to STEM subjects.

PARTICIPANTS
Two schools, a university, a company offering bespoke software development services and training in ICT, a company specialising in corporate training solutions and knowledge dissemination and a technical consultancy designing and building hands on training tools.

ACTIVITIES
The main objective will be achieved through the following activities:
- Elaborate and validate a guide for building, configuring and using the DIY computer in the classroom
- Design and develop a curriculum and lesson plans for using the STEMKIT DIY computer, based on Raspberry Pi edition, to teach children programming through the creation of Minecraft Pi games to be played on the console also in combination with electronics gadgets the children will build and which will enhance understanding of programming concepts (e.g. traffic lights units for experimenting with loops) or STEM (e.g. ambulance with siren controlled by the console to demonstrate the Doppler effect)
- Design electronics kits to be used in support of the curriculum and to be built by children to use with the console as an educational hands-on play approach
- Prepare a social learning environment utilising motivational workflows such as the recognition of achievements through the awarding of badges, for the delivery of the curriculum to teachers/educators and for skills retention purposes
- Test and pilot the outcomes under real conditions with the teachers and deliver a final release
- Support the final outcomes through a dedicated virtual space (STEMKIT Club) providing access to all project results and infrastructure for supporting the growth of a community of adopters/practitioners/enthusiasts.

METHODOLOGY
An iterative methodology: three versions of the results are produced, one in each iteration. After each iteration the results are tested/validated and based on the conclusions the next iteration is planned.

RESULTS

- STEMKIT DIY Computer, breadboards, jumper wires, buttons, switches, LEDs, etc.
- Electronics Kits to be used with the STEMKIT computer
- Guide and blueprint on how to assemble the STEMKIT, install the software and configure the GPIO
- STEMKIT Curriculum and lesson plans
- STEMKIT Educators guide
- Learning Portal with integrated skills and achievements framework
- STEMKIT Club virtual space with supporting infrastructure

TARGET GROUP
In the life of the project: professionals working with children of 8 – 13 years. Apart from these direct target groups, the beneficiaries comprise also indirect target groups such as schools, children's/parents associations and organisations, policy makers and educational stakeholders deciding about subjects covered by school curricula, parents, content developers, etc. After the life of the project and subject to the delivery of concrete results, more target groups become relevant, such as commercial organisations producing serious games for educational purposes, universities with pedagogical/engineering departments, educational bodies, STEM toys manufacturers.

BENEFITS
- Elucidate findings regarding to ways of introducing children to programming and STEM through hands-on play.
- Create evidence-based policy and research recommendations for the use of games in the teaching of coding and the re-enforcement of educational hands-on play, especially for STEM related subjects
- Act as node of knowledge dissemination on how to engage children with programming and STEM
- Devise strategies for the adoption of educational hands-on play in the classroom
- Provide a pool of expertise and technical assistance to start-up awareness nodes (e.g. Code Dojo)

Link to project card: [Show project card](#)