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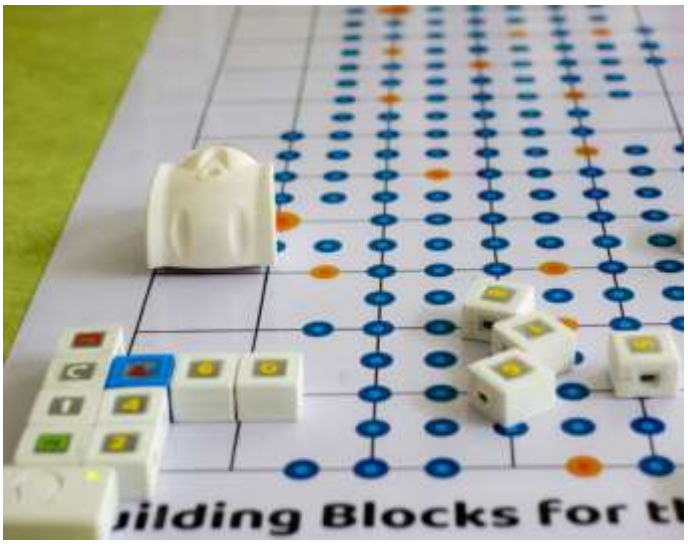

Why TangIn project?

TangIn aims to produce and deliver a set of educational resources and materials to promote and support the effective use of tangible programming concepts by teachers in daily classrooms (at primary level schools) while teaching STEM-based subjects.

These resources will enable teachers to introduce tangible programming concepts and STEM-based subjects to young students in a fun, engaging, pedagogical and inclusive way. Even teachers with no background in neither using ICT or digital-based tools will be able to promote and teach tangible programming concepts, with the support of physical interfaces (e.g.: blocks commanding a simple robot).

Main findings from teachers' questionnaires and focus groups

A European survey collected teachers' perceptions about i) tangible programming concept and tools, ii) which ICT-based tools and services are being used and iii) how could tangible programming be included in the daily teaching practices. Answers were collected in Portugal, Spain, Bulgaria and Latvia, with the majority of the respondents having more than 16 years of experience in teaching (63%). The key findings include:

- Computer (97%), smartphones (68%) and tablets (50%) are the devices mostly used by teachers in their personal lives; in terms of services, email (92%) is the most used, followed by social networks (65%) and communication tools such as Skype (27%).
- Considering the classroom setting, 94% of the teachers have one computer to use, but only 26% of the participants have the minimum ratio of 2 students per computer. Besides, only 5% of the teachers have access to a robot, 10% to tablets and 15% to 3D printers. However, the access to multimedia projector (83%) or internet (79%) is very positive.
- 97% of the teachers find important, very important or critical for their young students to learn and develop programming skills and logical thinking skills. Ideally, almost half of the teachers believe that those skills should be introduced at the primary education level, while between 15% to 21% defend that this should be possible even at the preschool level.
- Tangible programming resources were selected by almost 60% of the teachers as preferable over PC/tablets in order to teach and learn programming concepts.
- Regarding the teachers' familiarity with the concept of tangible programming and its tools, 68% of them were not familiar with the concept of tangible programing, while more than half of them have affirmed that were not at all familiar with any of the teaching programming tools presented. Similarly, the clear majority (89%) had no previous experience in teaching programming.
- 84% of the respondents are interested in join a training course on the use of tangible programming concepts and 93% of them are willing to use tangible programming resources (13% twice a week, 31% every week, 19% once every two weeks).
- Mathematics, ICT/programming, Natural Sciences, Physics and Geography where the elected subjects by teachers as most suitable to introduce tangible programming concepts.

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

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Why tangible programming?

Research shows that there are several advantages in using tangible programming in primary school education when compared to the use of graphical languages (traditional coding or programming with graphic objects, for example). These include:

- It facilitates collaborative peer-to-peer programming;
- It facilitates debugging processes, that is, procedures that consist on searching, detecting and correcting errors;
- It helps to narrow gender differences of interest in computing;
- It promotes physical involvement, since children learn by increasing the senses used (touch, sight, hearing), which enables a better discovery of the world through touch (considered of supreme importance in the construction of learning, in the knowledge of the world and in the appropriation that they make of reality).

STEM topics of the primary school educational curricula to work on

Mathematics	Natural Sciences
• Decimal parts of a figure • Determination and marking of parts • Drawing, recognition • Straight, curved, broken, closed open lines – recognition, drawing • Drawing, recognition • Measurement, calculation • Radius, diameter – drawing, measurement • Drawing, measurement, calculation • Counters, sum • Reducible, reducer, difference • Multipliers, multiplication • Divisible, divider, breakdown • Friendly similarities operations	• Student knows how many days there are in one week and how many months in a year • How to use calendar in daily tasks • Seasons change • Compare objects by their form and size • Measures length of objects and writes down measurements using correct units of measurements (cm, m) • Development of perseverance and purposefulness by doing research • Analysis of collected data • Creation of drawings, tables, diagrams from given data • Movement of Earth • Location of Earth in Solar system/ planets • Globe/ map • Land and water distribution on Earth • Continents

Consortium:

www.tangin.eu

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What is next?

Toolbox and Teachers Guide development

After the publication of the final report on "Framework for using programming concepts to stimulate learning of STEM subjects at primary school", all partners will dedicate their time to the development of the TangIn toolbox of resources.

This toolbox is dedicated to schools, school teachers and school managers and will be composed of a set of educational activities to be implemented in daily classes. It will include specific activities or lessons covering different STEM-related topics at all levels of the primary education. Each educational activity will include:

- A summary description of the activity and its objectives;
- Its connection with the school topics, subjects and levels;
- Expected learning outcomes;
- Guidance for the implementation of the activities;
- Resources needed.

The activities will have a suitable suggested duration time (in order to be used in normal classes) and will be designed by taking into consideration the national curricula, enabling its use at the four testing countries. However, a pre-test and validation phase will occur in Portugal at Murtosa School Cluster, with the involvement of at least two teachers of different classes.

The toolbox and the pre-testing phase will be supported by a teachers' guide manual, which will assist teachers in implementing the educational resources, enabling them to extract the full potential of each activity and of each students group and, at the same time, explore alternative options to the suggested approaches towards the activities. The guidebook will also provide insights on how teachers can access the skills developed by students, i.e., assess the impact of those activities on students learning and motivation.

European Workshop for teachers to be held in Aveiro

A 5 days European workshop for teachers will be promoted by U. Aveiro, in Portugal, to train a group of 16 primary school teachers. The course will cover topics such as "What is tangible programming?", "How can tangible programming be used in educational contexts?" and also "What is the TangIn toolbox of resources and how can those resources be used in school education to stimulate students for STEM-based topics and foster inclusion?".

Stay tuned to learn more about the next project activities!

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