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INBOTS Workshop with teachers on the Uptake of Robotics in Education

By EDUMOTIVA, December 1, 2018, Athens

In the frame of the INBOTS project and the European Robotics Week 2018, a workshop on the uptake of Robotics in education was organized by EDUMOTIVA. The workshop took place on December 1, 2018 at EDUMOTIVA premises in Athens, where teachers engaged in educational robotics were invited to present their experiences and discuss on the following agenda:

1. the drivers for the introduction of robotics in education
2. the obstacles and the barriers
3. what changes are needed?
4. Do they feel well prepared to contribute to the introduction of robotics in education? which are their training needs? which tools and resources they need for their training?

16 teachers from various levels of formal and non-formal education participated and had the opportunity to express their opinion about their training needs and the current status of the incorporation of robotics in education. The diversity of their background (computer science, physics, mathematics, technology) and their experiences from their participation in relevant research and educational robotics projects contributed to a fruitful and lively discussion that lasted for 2.5 h. The workshop originated a dialogue about the uptake of educational robotics and brought up on the stage the importance of education for the smooth uptake of robotics in society. The discussion was audio-recorded, and the answers are summartised below.

1. Which are the drivers for the introduction of robotics in education?

Robotics competitions motivate pupils, students, parents and teachers to be involved in educational robotics by preparing a project to participate and face the challenges of the competition, in order to win. Large companies specialized in educational robotics offer robotics kits, although their educational approach is affected by the promotion of their own products.

Participation of teachers in relevant research or educational projects motivates their interest in educational robotics by cooperating and forming interdisciplinary groups of complementary background. Participation of students in exhibitions to showcase their robotic projects supports their interest in robotics and boosts self-esteem.

Moreover, educational robotics in both formal and informal education seems to contribute to the social inclusion of migrants, who face the difficulty of the different language, through their possible employment in this field, while there is evidence that also helps people with special needs.

According to the experience of a teacher up to now, the primary school curriculum is flexible and the teacher can decide to introduce robotic activities in the class. Moreover, in schools with technological orientation the flexibility of the school curriculum allows the introduction of activities in robotics, while cooperation between teachers of interdisciplinary background, relevant to robotics, is feasible and facilitated. The school achievement of students was reported to be improved after the introduction of robotics in school curriculum, especially for the cases that students had shown low interest before.

2. Which are the obstacles and the barriers for the introduction of robotics in education?

Several obstacles and barriers for the introduction of robotics in education were reported. In the frame of formal education, the general status is that robotics is not incorporated in school curriculum in practice. Though robotics is included in the syllabus of informatics course in some grades, in reality it is introduced through lectures and demonstrations and not through hands-on activities. however, some teachers take often initiatives and organize

activities to introduce robotics in their class, after a permission from the director of the school, or very often in extracurricular activities after the school day, supported by parents' associations in school premises.

Nevertheless, in the final grades of the high secondary school the preparation of students for the exams to enter the higher education is a serious obstacle for the extracurricular robotics activities to take place. Moreover, in the case of the incorporation of robotics in the school curriculum, the number of pupils in classroom is big and there is not enough time and place for the realization of projects in robotics. Furthermore, there are not enough teachers trained in robotics, teachers are not provided with guidelines and resources or there is a lack of equipment.

The participants agreed that there is neither a long-term strategy on behalf of education authorities, nor a curriculum. It was emphasised that there isn't a smooth and consistent introduction of new technologies in the school curriculum from primary to secondary level that would make easier the introduction of robotics.

3. What changes are needed?

In order to achieve the smooth incorporation of robotics in education, an informative campaign was suggested including seminars and discussions with teachers, policy makers and parents to inform for the benefits of robotics in education and overcome misconceptions and other obstacles, and emphasise the potential of educational robotics to contribute to the development of the 21st century skills for kids and to their future integration in the labour market. Both bottom-up and top-down approaches for the uptake of robotics in education were proposed to be followed, providing teachers with the necessary resources, tools, equipment and continuous training to enable them to incorporate robotics in STEAM lessons, while the need for changes in the school curriculum were emphasised to make room for flexible zones where robotics projects might be realised.

4. Do they feel well prepared to contribute to the introduction of robotics in education? which are their training needs? which tools and resources they need for their training?

Participation of teachers in thematic groups, relevant communities and research projects helps them to overcome common obstacles, to find solutions for the smooth introduction of robotics in education. Cooperation and extroversion are needed, considering at the same time the ethical, legal and humanistic aspects of robotics.

A long-term strategy on behalf of the education authorities is required providing opportunities for funding, infrastructure, equipment and necessary pedagogical and organizational changes in the school curriculum, while continuous training of teachers is

necessary, in order to prepare and support them to drive the introduction of robotics in school education and make them feel more confident in this role.

It was proposed that teachers of informatics and technology should cooperate in order to achieve the successful introduction of robotics in the curriculum. A general top-down approach is required so that a common language about STEAM education and educational robotics is established and the educational system is reconsidered according to the needs of the society redefining the school curriculum and providing the teachers with the appropriate educational tools and equipment.

Finally, the teachers emphasised their interest to continue this dialogue in the frame of upcoming workshops and events, as well as to share the ideas under discussion within their communities.

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