USE OF IMMERSIVE REALITY TO TRAIN CONSTRUCTION SAFETY

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Abstract

Construction sites are dynamic and complex environments, making them difficult to control and monitor. Construction safety prevents people from dying or becoming incapacitated. It is a socially relevant issue that persists despite several initiatives. To cope with the pressure of avoiding accidents development, safety can no longer rely on traditional accident preventions measures. The project is co-funded by the Erasmus+ Programme of the European Union and arises from the synergy between higher education institutions and construction company provider to implement the use of smart technologies in proper training. The digital tools allow the creation of instruments that simulate construction scenarios allowing the identification and prevention of risks for teachers, technicians, and engineers. This approved project aims at enhancing knowledge exchange between representatives of three sectors to innovate the accident prevention approaches through effective collaboration between researchers in the virtual reality filed and construction companies. The project will develop innovative and interactive IR (Immersive Reality) solutions based on BIM modelling capacities to prevent accidents and train workers. The project intends to create usable tools for teachers, technicians, and engineers that will be used in any construction project. Project also aims at offering training sessions online on an online platform (project website, wiki) to grant learners and trainees access to interactive material and resources. These tools range from applications to be used on smartphones to virtual reality contexts depending on the needs of training.

Keywords: Immersive Reality, Accidents, Prevention, Training, BIM.

Novel Characteristics: Training with Immersive Reality and Simulation

Project design was based on joint analysis and on partners' know-how and experience, to propose viable solutions. The specific aims for the projected are:

a) Developing, implementing, validating and tuning of interactive IR approaches to promote multidiscipline creativity, innovative thinking, and practical skills in the digital era;

b) Ensuring education and research are mutually reinforcing, and strengthening the role of institutions in their local and regional environments;

c) Explore synergies and stimulate greater dialogue between HE, enterprises and VET schools, in the scope of community and outreach activities;

d) Supporting the civic and social responsibility of students, workers, engineers and technicians.

To elaborate on the previously mentioned aims and objectives the project includes:

a) Contribute indirectly to encourage VET and HEI students and staff to get involved in construction safety;

b) Project intends to promote best practice exchanges, supporting the development of more varied teaching methods and personalized training, in accordance with the 2012 "Bucharest Communication" (Ministerial Conference-EHEA) recommendation of promoting 'student-centred learning' characterised by innovative methods of teaching;

c) Project pedagogic development, together with its activities, are expected to mobilise institutions, teachers, engineers, workers and technicians. The project interactive learning tools development and maintenance of an open, collaborative repository, tutorials and operational guides that support the performance of specific tasks;

d) Contribute towards the development and application of tools and practical guides for architects and engineers involved in construction design.

By taking into consideration the listed aims the project will be achieving and focusing on the collaboration and knowledge exchange between the HEI/VET organizations and construction companies. In addition, the advancement and innovation in a human resources education and training perspective may benefit the construction companies and helping the development of an entrepreneurial mind set and foster future cooperation. Nevertheless, allowing the collaboration between HE and enterprises the project may develop the creation of an educational and training strategy that may boost the health and safety competences and investment in construction industries.

Features to be demonstrated – Effectiveness of training and validation of competences

The project is following a collaborative and hands-on strategy to learning, integrating a broad vision concerning a project where the activities establish a very close and interconnected cooperation, where the exchange of co-creation of knowledge between HEIs and construction companies is a key factor. This methodology defines the responsibilities of the stakeholders during the project and within all its phases. Furthermore, the tools to support an enhanced cooperation are defined as well as the training sessions to convey the competences (knowledge, skills and attitudes) necessary to prevent accidents in construction.

Therefore, the project's activities will encompass different types of international activities that will happen in the partner countries to fulfil the project vision. These will require the development of equipment and of software resources (innovative use of integrated IR tools), online content and digital platforms (supporting the dissemination of knowledge, the training and the validation of results), and collaborative processes (to facilitate group and exchange cooperation). This intends to portrait the work reality of collaborative teams needed to prevent accidents in construction sites. The project development of realistic simulations based on existing developments and respective adaptations will provide to all those involved the possibility of experiencing a practical learning and training approach in a virtual environment like the one they may find in their future construction sites.

The tasks were developed according to the expertise of each partner. Besides project management, and quality assurance tasks, the project activities were divided into 4 main groups. Preparation with identification of the state of art in the field strategies, solution, trainings, studies, technologies etc. and selection of an online platform for interaction with users and content developers. Development and implementation address the physical content of interactive IR tools and learning content with development of interactive simulations, IR models and simulations, written materials/manuals, and other forms of pedagogical publications. Validation and tuning are dedicated to development of activities in laboratories, construction sites, workshops and other facilities and testing of the learning tools amongst other HEIs so they can be improved, gauged and validated. The exploitation and dissemination events will consider user participation and location, activities can be divided in three main groups (lab centred events, site centred activities, online activities) and content will be developed to allow use in different environments.

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