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# *A Model of 3D IWB Technology in the Concept of a Dual Education System*

**Extended summary**

An educational environment must ensure quality equipment, quality content, data, theories, explanations and information, quality presentations of facts and research, but also demonstrations of work techniques and production procedures. Contemporary education is a creative, innovative, inspirational and working environment. The curricula of the contemporary dual education system concepts are aimed at adapting the focus of vocational education to the demands of the economy, i.e. to carrying out practical education and training as well as testing in companies. Considering the structure of the school subjects and the subject matter, it can be concluded that the ICT equipment, specialized tools, educational and application software for the presentation of the material, demonstration of events and testing are necessary for the realization of a good quality dual education process and expected outcomes. In short, tools and a real environment are necessary to carry out educational processes.

The development of Interactive White Boards – IWB in 3D technology reduces the shortcomings of demonstrating and simulating the ambience, environments, audio-visual experiences and multi-sensor interactions. This paper describes a new conceptual model of employing the 3D Interactive White Boards in the teaching process, i.e. its effects from the perspective of the dual and vocational education. The development of the Interactive White Boards in the direction of 3D technology has brought about a new quality of detailed graphic representations, and has achieved interaction and integration with available databases, relevant theories and tutoring systems. By applying contemporary Interactive White Board technology in 3D, we achieve an educational environment characterized by spatial multimedia that acti-

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vates all senses with higher intensity and affects the stimulation of cognitive processes, skill development and muscle memory.

New models of teaching in a new environment must serve the purpose of increasing the efficiency of mastering knowledge, but also the development of skills. The constant intent in the design of contemporary teaching, especially in a dual education system, is:

- to make teaching tools simple for teachers, of a high quality and effective for students, and efficient overall,
- to satisfy the need to specifically and generally activate the senses during the teaching process.

The need to simulate an environment of a process being studied or observed is particularly important in a dual education system. The reason for this is not only learning itself, but also the fact that the actual tools and resources are expensive and unavailable, that procedures can be very dangerous, or the conditions where they are carried out present a high risk for the staff and the environment. Virtual Reality – VR, as well as Augmented Reality – AR, is an environment that is still expensive, complicated and often unavailable to most education centers. VR is a computer generated, virtual world in which a user can interact with all objects placed there. For this reason, VR technology is sophisticated and expensive. AR environments are created as an attempt to fuse the real world with the virtual world. AR is a direct or indirect view of the physical environment in the real world where certain elements are augmented via computer generated procedures or extracting sensory input from the real world such as sound, video, graphic, tactile or GPS information. Both these technologies have the aim of introducing a user to a topic using a large number of interactions. From that perspective, their use in education is limited and still underdeveloped, especially at lower levels.

A compromise between new demands and possibilities in the realization of contemporary education concepts can be found in the combination of IWB, Classroom Response Systems – CRS and 3D environments. The 3D IWB systems provide the simulation of an environment as a very important component, but also the simulation of interactivity as a necessary component. For a quality simulation of events, i.e. the possible effects of variables of the environment, it is necessary to predict the simulation of alternative events, or scenarios. For this reason, apart from a database, a new concept must contain the experience and scenario databases in order to simulate alternative events and outcomes. There are many situations for designing and carrying out these exercises: welding in the presence of flammable fumes, firefighting in energy production facilities, logging in dense forests, mixing hazardous chemical solutions, and many others. These are all possible with no risks taken in an environment simulated by using a new 3D IWB CRS.

During a presentation or the design of a problem, input is defined first, variables second, and finally, the expected and acceptable results (frames) are considered. As in real conditions, the simulated conditions require tools, trained staff or the staff familiar with the processes (in theory and in practice), and appropriate working conditions for the realization of every process. These are the factors that define the environment, i.e. the simulation of the process. Each of these factors can range in value from adequate to acceptable, to inadequate. The parameters that describe the factors are presented by the corresponding scales that range from optimal to

out of tolerance. Regardless of the available tools and the process parameter values, sometimes processes are carried out in high risk conditions. In that case, the only known and declared factor of the process is the level of training of the staff. Scenarios can be created, processes simulated and outcomes predicted, as well as exercises designed and carried out based on this single parameter.

**Keywords**: applicative software, information-communication technologies (ICT), interactive white-board (IWB), dual education, three-dimensionality (3D).

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