



Shaping the Intelligent Classroom of the Future

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ABSTRACT

Over the years, research efforts to create a “smarter” classroom resulted in developing and employing distance learning, educational games, and intelligent tutoring systems. More recent approaches have revolved around the domains of Ambient Intelligence (Aml) and Internet of Things (IoT) with the objective to enhance traditional classroom equipment and furniture with processing power and interaction capabilities (e.g. intelligent desk), as well as integrate emerging technologies (e.g. Augmented Reality) in the teaching and learning processes. This work explores the general concept of the future classroom and proposes a set of key facilities that should be incorporated in order to create a holistic student-centric educational ecosystem, which will employ state-of-the-art technologies to support (among others) alternative pedagogies, learning through immersive hands-on experiences and collaboration.

In more detail, the classroom of the future will have the ability to create immersive experiences by employing projectors or using surrounding interactive displays, enabling students to interact with the real world in ways that were not possible before. The role of the classroom walls will be dual; on the one hand they will act as interactive smart boards, where typical educational content (e.g. multimedia, notes, exercises) can be presented, and on the other hand they will be able to immerse the students into any environment relevant to the course’s syllabus (e.g. a cave, a rainforest). Apart from the walls, enhanced glass technology will allow natural sunlight to be the primary source of light in the classroom - since it reduces headaches and improves learning rates - but will also control the amount of light entering the classroom based on the context of use (e.g. minimize light when watching a video). Such technology will be also able to transform the windows into secondary displays presenting supplementary content. Additionally, advanced X-Reality technologies in conjunction with the immersive environment will be employed to create highly compelling experiences and change the way students learn.

Regarding the classroom furniture, the student desk will feature a modular design where customizable surfaces can be added or removed on demand in order to support the needs of different courses (e.g. for the Geography course the students can use the surface featuring a globe dome, a compass and the embedded touchscreen display). The teacher, on the other hand, will be able to monitor and manipulate every aspect of the intelligent classroom (e.g. ambient facilities, educational software, intelligent behavior, automations) from a comfortable workstation (i.e. an armchair with an embedded tablet). Physical books will still be present in the classroom of the future, due to their indisputable educational value. However, selection and retrieval from the “Intelligent Bookcase” will become a much more sophisticated and entertaining processes via robotics, Artificial Intelligence (AI) and Augmented Reality (AR) technologies.

Finally, it is foreseen that the classroom will be equipped with educational robots that will support both students and teachers during the educational process, while advanced prototyping facilities (e.g. 3d printing) will enable students to give shape to their wildest ideas.