

# ARiSE: Augmented Reality in School Environments

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**Abstract:** As a world-premiere, the ARiSE Consortium presents the Augmented Reality Teaching Platform (ARTP) and Spinnstube® at the ISMAR 2006 conference. ARiSE is the next step in teaching and learning for basic, middle, and high schools. A mobile AR teaching platform is integrated into the everyday environment of teachers and students, displaying audiovisual and multi-media content complying with the needs identified by education experts and researchers in the relevant areas.

**Keywords:** Augmented reality, 3D graphical augmentation, object overlay, maneuverable augmented reality display system, visualization, 3D modeling, human computer interface, interaction devices, authoring tool, collaborative learning, AR for education, training, and computer-supported co-operative work.

**The ARiSE Objectives:** ARiSE is an innovative teaching aid based on Augmented Reality technology. It enables teachers to develop, with moderate efforts new teaching practices and curricula to bring scientific and cultural contents to school classes in an easy to comprehend way.

Using 3D presentations and user-friendly interaction techniques will lead to a better understanding of scientific and cultural content coupled with high student motivation. The students will have the possibility to interact together with the virtual objects in a virtual shared space provided by an AR display system and thereby perform learning by doing instead of learning by reading or listening.

Furthermore, the ARiSE technology will promote team work, collaboration between classes in the same school, or even remote collaboration between schools in different countries.

The ARTP is a highly flexible, robust and well affordable Augmented Reality framework consisting of a display system, related software and innovative content. It allows students to interact with the teaching material in 3D and at the same time it supports a team-oriented approach in school classes. It raises the level of understanding of complex processes with the students through immersion and self-experience. While acquiring scientific and cultural knowledge, important soft skills like team work and presentation skills will be trained as well.



Figure 1: Spinnstube® with 4 seats

The Spinnstube® is ARTP's modular and scalable AR display system. It physically consists of 2-5 seats for a student group and a table with a real object in front of the students. A Spinnstube seat itself consists of a networked computer, a projector, a tilted mirror, a projection screen, a see-through mirror, tracking cameras, loudspeakers, and finally a stand to hold the equipment mentioned. Spinnstube® uses the active stereo/ active shuttering display technique. The students wear shutter glasses and they have an interaction device each. It is not limited to school environments. It can be a playground and battlefield for creative people in all phases of the industrial production process.

**The Demo:** The demo will show the well-known labyrinth game with Augmented Reality and in 3D.



Figure 2: Labyrinth game

In front of a user on a table there will be a wooden labyrinth game. This game is made of a wooden box with two knobs that can tilt the top surface where the labyrinth is located. We have replaced this wooden labyrinth with a flat surface and a marker and we therefore can augment a virtual labyrinth on it.

This virtual labyrinth has much more features than the real one; there are slides, springs etc. There are also sound effects making the whole experience even more attractive. The whole game is well-known, very intuitive, and easy to grasp.

**The ARiSE Consortium:** The ARiSE consortium comprises experts from different areas of information technology, but also expertise in didactics and pedagogy as well as schools, which provide opportunities for testing the developed platform in class. School scenarios - including process visualisation, guided construction, and remote and telepresence - will be developed and tested by several classes in different European countries. The ARiSE project is funded by the European Union through the IST programme under FP6 with the contract number IST-027039. The project partners are Fraunhofer IAIS, Germany; Siauliai University, Lithuania; AcrossLimits, Malta; ICI, Romania; CTU Prague, Czech Republic; Juventa Basic School, Lithuania; Freundeskreis RAMA, Germany.

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- [2] Manfred Bogen, Jürgen Wind and Angele Giuliano: ARiSE - Augmented Reality in School Environments; to appear in: Proceedings of ECTEL2006 - First European Conference on Technology Enhanced Learning, Crete, Greece; October 1-4, 2006