Augmented reality advances the learning especially in informal science education context

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Picture depicts boy with situation motivation. Credit: Timo Suvanto

The aim of this research project was to analyse learning using Augmented Reality (AR) technology and the motivational and cognitive aspects related to it in an informal learning context. The 146 participants were 12-year old Finnish pupils visiting a science centre exhibition.

The results showed that AR-technology experience was beneficial especially for the pupils, who otherwise belong to the lowest achieving school success group. They were reaching up the gap with other students while learning science. On the other hand, the students with the high-performance school success gained more challenge and quality for the learning outcomes.

Augmented Reality (AR) differs from Virtual reality (VR): VR is totally virtual and illusion, but AR creates mixed reality by adding visual elements into real, physical environment around us. This research group from the University of Helsinki has been doing research related to informal learning and Augmented Reality for more than a decade now. Now, only after the Pokémon phenomenon this AR-technolgoy has become known by wider audiences. However, many experts don't consider the Pokémon technology as AR-solution, but as the recent Scientific American calls it as "location-based entertainment".

"Utilizing ICT- and digitalization in education is much hype. The majority of the comments are based on everyday knowledge and anecdotes. The number of evidence-based education research reports is astonishingly small," says Professor Hannu Salmi from the University of Helsinki, Finland.

"Several ICT-based educational materials are old-fashioned. The text-books have only been converted into digital form. However, by the latest technologies like AR allow to create totally new type of learning solutions and not only to transport old knowledge into a new format. Our team has been developing clearly defined phenomena like the molecule movement in the gases, gravity, sound waves, or aeroplane wing physics. This is not only for learning the knowledge based facts, but learning by doing to make the observations is developing the thinking skills - learning to learn, as well."

"Video games and computer based entertainment and serious pc-educational games have traditionally been more beneficial for the boys. However, in this AR-case there was no gap between boys and girls in post-knowledge testing; thus the girls benefitted more from the informal learning experience than the boys," says Helena Thuneberg, the senior researcher from the University of Helsinki. "Girls had a higher relative autonomy experience (RAI) as an important background factor for high-performance learning. Meanwhile, situation motivation was much more strongly inter-connected among the boys."

AR seems to be also a good tool for different learners. It is bridging the gap between formal education and informal learning in an effective way.

The research was conducted by the University of Helsinki science centre pedagogy group and the results have been recently published in the *Journal of Science Education*.

More information: Hannu Salmi et al, Making the invisible observable by Augmented Reality in informal science education context, *International Journal of Science Education, Part B* (2016). DOI: 10.1080/21548455.2016.1254358

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