Заявка на участие в III Всероссийском конкурсе научных переводов (английский язык)

ФИО	Место обучения (полностью, не аббревиатура)	ФИО научного руководителя	Email

Augmented Reality Applications in Education: Teachers Point of View
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Augmented Reality: Barriers and Limitations

As with all technologies, limitations, drawbacks, positive and negative impacts of educational AR applications have been identified by researchers and, at the same time, solutions have been proposed. Some of the limitations most frequently mentioned in the surveys are:

– Usability issues: usability issues have been reported based on the fact that students find AR complicated and difficult to use, face technical problems while using an AR app due to device characteristics such as a small size screen, network speed, or battery capacity. Other studies describe as a drawback of using AR technology the student distraction and cognitive overload.

– Features of available software: financial cost, current state of the art mostly on GPS, the lack of tools designed for education as general-propose AR applications are not education-oriented and inadequate for educational use), limited availability of built-in monitoring features and assessment tools that are either not provided at all or are available only on commercial (paid) editions, are some of the barriers of AR adoption and research conducting.

– Research and practical restrictions: for conducting a survey either in the class context or in the natural environment, difficulties and limitations must be addressed. In an outdoor natural environment, the weather conditions and physical characteristics could change initial plans (e.g., when physical objects are used as triggers every change in lighting and vegetation affects the overlay's launching) markers or QR Code on each desk, adjusting the lighting) is required. Common important factors in both contexts are adequate technological equipment, trained educators, student willingness and the school administrations' collaboration, additional lecture time for the effective use of AR applications, a small research sample, limited research duration and use of the application as information tool and not as an instrument for experimentation.

– Diffusion of AR technology: AR technology is still relatively new to education. In Greece, the use of AR in education is limited while in other countries it is widely used in all education levels. Also, in the study concludes that students are not familiar with the use of mobile technology in the learning process, although they are familiar with mobile technology in everyday life. Another study has shown "that AR technology can be misunderstood by some students and may encourage them not to

study outside the class" or students "find the AR components more interesting" than the course topic.

– Complex process of AR applications development: the development of an AR experience is a time-consuming and complex process that demands more than one instructor for proper implementation, especially in location and place-depended applications. It poses technical challenges, requires skilled instructors, the involvement of computer specialists and the use of software for image and video editing and computer graphics creation.

– Teachers' and students' involvement in AR applications development: the active involvement of both teachers and students in AR applications development is proposed in order to achieve better learning outcomes. The teachers' involvement is also proposed because there is a difference between a designer's and teacher's perspectives and teachers are more pedagogically trained than ICT experts.

Social acceptance is considered as a more challenging factor than expected and even though new applications appear, there is a slow diffusion to the public.