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D4.1
Interfaces/Components and UX of XR4ED platform

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XR4ED Project Profile

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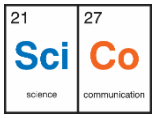
Partners

	CYENS	RESEARCH	CYPRUS
	KONNEKTABLE	SME	IRELAND
	SciCo	SME	GREECE
	F6S	SME	IRELAND
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	KAINOTOMIA	SME	GREECE
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List of acronyms

Acronym	Description
XR4ED	Extended Reality for Education
AR	Augmented Reality
VR	Virtual Reality

Executive summary

The Interfaces/Components and UX of XR4ED platform Deliverable (4.1) is part of the Platform Agile Development and Deployment workpackage (WP4). The deliverable reports on two tasks, task T4.1 and T4.2. In task 4.1 modern XR Tools provided by the consortium were researched and used in the following task where the implementation took place. Task 4.2 (which is mainly what the deliverable is about) exploits existing XR techniques, technologies and tools. Advanced XR user interfaces were created to accommodate typical collaborative learning practices, and several prototypes were designed and implemented.

1 Introduction

XR technologies have the potential to transform many aspects of our lives, from the way we learn and work to the way we entertain ourselves and explore the world around us. They are designed to create more engaging, immersive, and interactive experiences for users, whether they are playing games, exploring new environments, or learning new skills.

XR technologies enhance learning by creating immersive and interactive environments that are not possible with traditional methods. VR simulations provide realistic settings for exploration, while AR overlays digital content onto real-world items, allowing manipulation of 3D models. XR fosters richer, more collaborative learning experiences, enabling students to use movement, gesture, and gaze for better engagement. It supports active learning, increases motivation, and allows learners to proceed at their own pace. XR also bridges formal and informal learning, improving knowledge transfer through contextualized and authentic tasks, and enhances attention, immediacy, and immersion in the learning process.

The main aim of this deliverable was to create two separate XR interfaces which main goal will be to present the user interfaces for collaborative distributed learning practices. The first XR interface is more lite, allowing for effective usage over the WWW. The second XR interface will allow for more ‘heavy’ capabilities based on state-of-the art XR hardware devices (i.e. magic leap) allowing for more sophisticated experiences. Learning experiences were also combined with gamified XR experiences and are illustrated as part of the ‘heavy’ solution.

2 Lite XR Example

FrameVR (https://learn.framevr.io/) is a versatile platform designed for immersive communication and collaboration. The main functionalities are the following:

- Cross-Platform Access: Users can join via mobile devices, desktops, or VR headsets without needing to download anything
- 3D Collaboration: It allows users to create and navigate through 3D models, photospheres, and video spheres
- Multimedia Integration: You can share documents, videos, audio, and screen shares within the virtual space
- Customization: Users can personalize their avatars and the virtual environment to suit their needs
- Event Hosting: FrameVR supports both small meetings and large events, making it suitable for various types of gatherings

It offers several features that make it a powerful tool for education:

- Virtual Classrooms: Teachers can create immersive 3D classrooms where students can interact with the environment and each other, making learning more engaging
- Interactive Lessons: Educators can prepare galleries or lessons that include multimedia elements like videos, images, and 3D models to enhance understanding
- Collaborative Projects: Students can work together on projects in a shared virtual space, fostering teamwork and collaboration
- Guest Speakers and Events: FrameVR allows for hosting guest speakers and virtual events, providing students with unique learning opportunities
- Real-Time and Asynchronous Learning: The platform supports both live classes and asynchronous learning, giving flexibility to both teachers and students

In XR4ED the FrameVR solution was used to demonstrate how a commercial platform can be used for creating learning experiences. KT implemented the FrameVR solution to develop an intuitive and immersive user interface tailored for educational environments. The interface will be designed to facilitate easy navigation within virtual classrooms, ensuring that both students and educators can seamlessly interact with educational content and each other. This implementation is also intended to compare and showcase how XR4ED solution stands alongside other similar solutions, by highlighting its strengths and unique features in delivering. A YouTube link showing the main functionality of the learning experience developed by KT is shown below:

- https://youtu.be/Vq3tU1SUbvQ

3 Heavy XR Examples

This part tries to address the above issues and offer a solution that can be used for enhancing the teaching process through XR based on the XR4ED project [6]. XR4ED is an Innovation Action EU project aiming at the design, deployment, piloting, and market entry for a novel product along with its value-added services. In this direction, the overall methodology of the XR4ED project implementation is targeted toward achieving the commercialization of the XR4ED platform.

We introduced an innovative XR educational system featuring a virtual avatar as an interactive teacher, which integrates PowerPoint presentations and real-time AI-driven user interactions. This system marks a significant advancement in creating dynamic and engaging learning experiences. By incorporating these mechanisms, it enables novel collaborative experiences, allowing teachers and learners to engage in interactive authoring and storytelling, thereby enhancing creativity and involvement in unique ways.

The focus is not on replacing the teacher but on providing extra support with an intelligent interface that can be easily used by a non-technical educator. The content that is required is only the teaching material of the teacher and optional videos and panoramic images. Artificial Intelligence (AI) takes care of the interpretation of the teaching material whereas the presentation is conducted through XR. Teachers have the option to select between two generic avatars, one male and one female. Both include body animations, eye gaze, head motion and lip-synchronization to increase realism.

Several features of the XR solutions that were created for the purpose of education and learning using both VR and AR. YouTube links showing the main functionalities of the learning experiences developed by CYENS are shown below:

- https://youtu.be/oHlrsoiJARY
- https://youtu.be/xlOAHhWNGHM
- https://youtu.be/3IzSFDTP9y0
- https://youtu.be/m8Sdd8VNOSg

3 Conclusion

In conclusion, this deliverable has detailed the Interfaces/Components and UX of XR4ED platform Deliverable (4.1), which is part of the Platform Agile Development and Deployment workpackage (WP4). It reported on two key tasks. Task 4.1 that focuses on illustrating modern XR tools provided by the consortium and exploiting existing XR techniques, technologies, and tools. This task led to the creation of advanced XR user interfaces designed to support collaborative learning practices, resulting in several prototypes. Task 4.2 that involved the development of two distinct XR interfaces aimed at enhancing collaborative distributed learning. The first interface is a lightweight version optimized for effective use over the web, while the second interface leverages advanced XR hardware, such as Magic Leap, to offer more sophisticated experiences. Additionally, learning experiences were enriched with gamified VR elements to make the educational process more engaging and interactive.