**2020 Technology Fee Concept Paper Proposal**

**Title**:Immersive Mixed Reality Technology: Enhancing Student Learning Experiences through Content Interaction

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**Joint Sponsoring Organizations**: College of Education, Education Technology Program – School of Teaching and Learning; George A. Smathers Libraries - Education Library

**Purpose and Specific Objectives**:

The College of Education (COE) in partnership with the Education Library requests $46,574 to purchase 20zSpace laptop units and the needed accessories (laptop cart & batteries) to enhance the teaching and learning within the COE, the College of Nursing, and the Florida Museum of Natural History at a minimum. One All-In-One (AIO) zSpace Desktop unit is requested for the Education Library. zSpace will empower the student learning experience through the innovative use of [zSpace technology](https://zspace.com/videos/zspace-intro) and the creation of authentic augmented/virtual reality, also known as mixed reality (MR). In essence, zSpace allows users to "pull" 3D objects or concepts from the screen and manipulate them with a stylus.

This project will support the mission of the University of Florida by providing a resource that will promote excellence in teaching, research, and scholarship. The requested units will complement an existing zSpace desktop unit that was integrated into the new Emerging Learning Technologies class in the Fall 2019 semester. The desktop version is the only zSpace unit at the University of Florida and in Alachua County.

As noted by the US Department of Education in 2017 National Education Technology Plan, zSpace technology represents one of the future technologies that has potential for transforming future learning experience (U.S. Department of Education, 2017).zSpace has been recognized as one of the fastest growing emerging technologies in the USA with over 1 million users (Graham, 2018) and over 180 higher education institutions worldwide have added zSpace to the technology they offer.Given these facts, access to students and faculty to practice using 3D technology in education meets the needs of UF’s mission to take a leadership role in innovating learning opportunities, transforming teaching practices, and staying current in the global education market.

Upon receiving this Technology Fee award the project team will:

* Provide access to high-end MR technology through zSpace immersive MR software.
* Mentorfaculty with integration of MR in student learning across the academic disciplines.
* Organize workshops for students to develop MR digital artifacts.
* Conduct workshops and tutorials for graduate assistants and faculty focused on the creation of customized MR-based instructional materials and learning modules in their respective disciplines.

**Impact/Benefit**:

The United States ranks 13th in science and 37th in math according to the 2018 Programme for International Student Assessment (PISA). Integration of zSpace will leverage student access to innovative strategies for delivering math and science content. A course developed and taught by Dr. Bojan Lazarevic, Emerging Learning Technologies, specifically utilizes zSpace to address issues in instructional design; create MR lesson plans; design mini-research projects focused on solving real-life learning problems; analyze patterns of user interaction with zSpace; develop MR files for 3D printers. Dr. David C. Blackburn, Associate Curator of Amphibians and Reptiles at the UF Museum of Natural History, expressed interest in partnerships indicating that the zSpace units will be integrated in the biology curriculum and as excellent support for informal learning with the Natural History Museum. Dr. Rose Pringle, Associate Professor of Science Education, also indicates that zSpace has the potential to be successfully implemented within the science education curriculum. A commitment to use the zSpace technology has been confirmed to begin in Fall 2020 for EME3813: Technology-Enhanced Learning Environment and EME2040: Introduction to Educational Technology. In addition, it is anticipated that the zSpace laptops will be utilized to support new instructional activities across the different undergraduate and graduate programs such as the newly established BA in Educational Sciences, Biology,Educational Technology (Master’s& Doctoral studies), UFTeach Minor in Mathematics or Science, etc.

The project team will conduct zSpace workshops for students and professional development for graduate students and faculty focusing on the integration of MR content in learning and teaching at UF. These workshops will provide a customized hands-on experience tailored to the learning/instructional needs in different disciplines. Workshops will be advertised widely across campus and hosted at the Education Library and other locations upon request.

Accessibility standards are embedded within the zSpace educational software. zSpace is ADA and UF Electronic and Information Technology Accessibility Policy compliant. The zSpace applications include an option for the information to be read aloud and are compatible with commonly used screen readers. All applications are available in English, Spanish, Chinese, and French with a selection of the applications available in up to eight languages.

Examples of MR instructional materials will meet the needs of courses across disciplines:

* Medicine: anatomy models, nursing (muscular, nervous, respiratory, endocrine system, etc.)
* Engineering: engines, machineries, force, string of lights
* Biology: biomes, leaf structure, photosynthesis, mitosis vs. meiosis
* Chemistry: molecules, atoms, chemical reactions
* Mathematics: geometry, graphing force and time, volume and surface area scaling
* Music: idiophones, musical ensemble
* Language & Literature: dramatic structure, prefixes, roots and suffixes, story starters
* Social Sciences and History: Hammurabi's Code, Roman ruin expeditions, medieval weaponry
* Multimedia Production: creation of MR instructional activities

The utility of zSpace units extend beyond the MR experience by serving as regular PC Windows-based computers with capability to be connected to printers, scanners, lab projectors or other peripherals and are compatible with Canvas. An array of academic and business software packages (e.g. MS Office, Adobe products, SPSS, Mathematica, etc.) can be installed on both zSpace laptops and AIO desktops. zSpace MR learning content is optimized for 3D printing using the LeopolyzSpace software, which allows 3D objects in .stl or .obj file formats to be printed out using 3D printers across campus. Or vice versa, objects scanned with a 3D scanner have the capability to be imported in to zSpace and viewed as MR content. The zSpace Studio software offers users the change to explore thousands of models from diverse categories, including dissectibles, biomes, animated models, and more. Users can complete premade learning activities or create their own.In addition, all activities within the zSpace system can be recorded and integrated in Canvas as instructional materials. MR content created in classes can be preserved as downloadable .stl or .obj files in the UF Institutional Repository.

Twenty zSpace laptops will be used as a mobile classroom set and shared among the College of Education, the Florida Museum of Natural History, the College of Nursing, and others as needed or requested. The AIO desktop unit will be added to the Education Library’s computer lab and will be available for any UF affiliate wishing to use it.

**Sustainability:**

The Education Library in collaboration with the COE supports this proposal. UFIT takes full responsibility in terms of maintaining the Education Library AIO desktop equipment as needed. The COE IT department has committed to maintaining the 20 zSpace laptop classroom set.

**Timeline:**

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| **Timeline: Month(s)** | **Action** |
| August 2020 | Funds awarded and technology purchased. |
| September 2020 | COE prepares classroom set for Fall courses. |
| Fall 2020 | Install AIO desktop in the Education Library. |
| Fall 2020 | Library develops and hosts student workshops and faculty professional development. |
| Fall 2020 | Course specific instruction. |
| Future Semesters | Continuation of development of MR content which will be preserved as downloadable .stl or .obj files in the UF Institutional Repository. |