CASE STUDY

OSUIT believes XR technology is the future of learning and wants to integrate it across all of their technical degrees.

OSUIT XR Integrated Curricula

Challenge

Oklahoma State University (OSU) has always been fiercely competitive, especially in sports with in-state rival The University of Oklahoma. However, one area where OSU has historically dominated is in preparing students for technical careers in energy, engineering, construction, and related heavy industries. This is largely due to the special relationship between the Oklahoma State University Institute of Technology (OSUIT) and its Fortune 1000 industry partners that help shape the degree plans to align to real-world skills needs.

In 2020, the president of OSUIT, Dr. Bill Path recognized the role that XR can play in delivering workforce education in unprecedented ways. Positioning OSUIT to grow its reach as a national leader in technical education. It's a bold vision that would require both public and private sector funding, and would revolutionize higher education. The initiative was named the XR Integrated Curricula program and XALTER was asked to execute it.

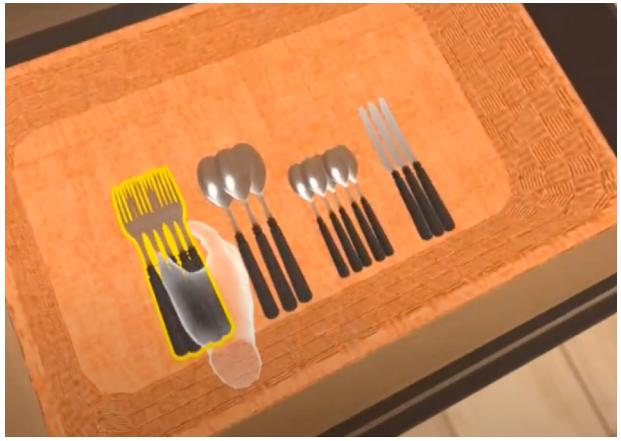
XR technologies were identified as key to helping OSU evolve its education strategy to provide hands-on distance learning in response to COVID, increased access to technology, and immersive learning experiences to align with how current and future university students prefer to learn. Additionally, the ability to virtually train students on large, complex assets (oil & gas infrastructure, construction equipment, etc.) that is not typically available for live training is a big advantage for preparing students for real-life work situations. Finally, XR-based learning can allow equipment training and simulations to be updated quickly as new products are introduced into the marketplace -- thus, students are always (virtually) learning on the latest/greatest equipment.

Solution

The first step in the process was to scope the big vision into a series of projects with clearly defined requirements, stakeholders, goals, and timelines.

An initial proof of concept was scoped and funded to deliver five XR learning modules across a broad spectrum of subject matters ranging from Culinary School tasks to engineering, construction, and transportation and heavy industry.

XR Module 1:
Table Setting for the Culinary Arts School



Students have limited time for learning and practicing proper place setting in casual and formal dining. Little time is available currently to teach and practice against multiple menus that range in complexity and style. The module will allow students to increase time to practice with multiple scenarios with varied complexity, and receive much needed feedback to elevate confidence and proficiency. In this series of XR learning experiences students will learn the elements of place setting, determine place setting based on menu, and identify mistakes in execution.

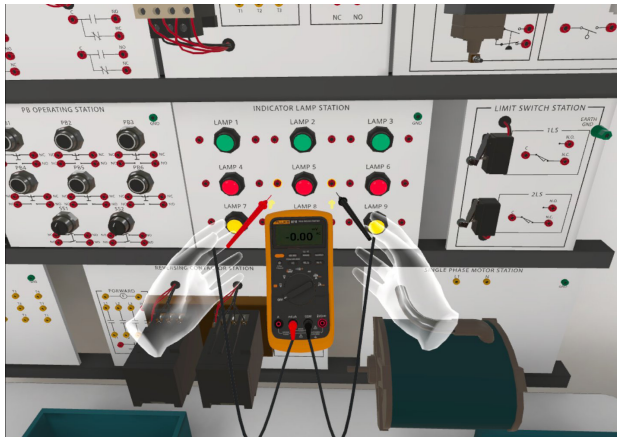
XR Module 2:
Steps of Service for the Culinary Arts School

In today's culinary world, front of house service can make or break a restaurant. The challenge, however, is the students' ability to practice in a live environment. Lecture and reading material can only advance a student so far. Live action practice in a simulated scenario is critical for learning service steps including the necessary soft skills. The module will give students the ability to practice the culinary service curriculum that includes 18 specific steps necessary to successfully serve a customer. Resulting in students of all backgrounds and experiences having a more uniform training regimen for a more consistent graduate.

XR Module 3:
Gas Compression Skid for Gas Compression Technologies Program

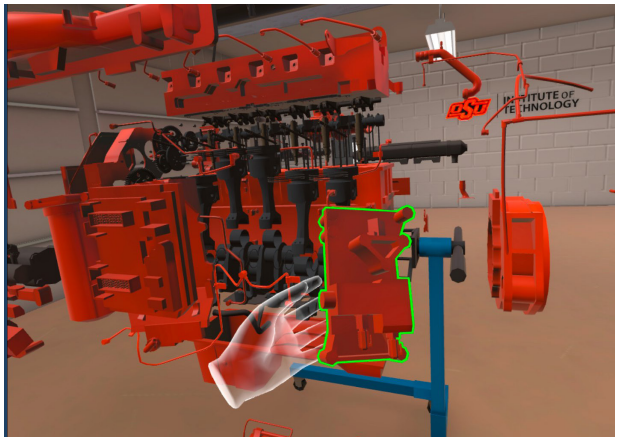
Knowledge and safety are critical, lifesaving elements in the world of energy and oil and gas. For most students, coming into a course around natural gas compression skids, it is other worldly. Instructors spend numerous days just teaching the name of the parts and their relationship with the rig and how it impacts the product and its movement. By creating a Gas Compression Skid simulation module in XR, students will be able to learn the names and functions of compression skid elements and properly “blow down” a skid prior to coming to class. This added instruction time will significantly increase knowledge and awareness. Instructors will be able to go deeper into subjects such as safety and allow for students to use the XR modules to review and practice, resulting in a more qualified student graduate population.

XR Module 4:
Instrumentation for Engineering Technology Program



Instrumentation touches numerous training tracts and degree programs of OSUIT. Historically, students have struggled with basic identification and also the initial understanding of how circuits work. As a result, machinery can easily be damaged as they learn through trial and error. Even worse, injury or death is possible if students are not properly trained and supervised. Students will now have a simulated XR control panel experience where they can learn, identify, and practice basic to advanced electrical safety. The virtual experiences will include learning the parts of a control panel and basic circuit components, connecting a motor/ generator and creating a circuit with lockout tagout procedures, and properly using a Multimeter.

XR Module 5:
Basic Engine for School of Transportation & Heavy Equipment



Understanding the inner workings of an engine cut across numerous technical training areas of OSUIT’s degrees and programs. By creating a fully rendered room scale VR engine lab, students will have the opportunity to do and experience scenarios that cannot be done in a traditional, physical lab environment. Students will now have unlimited access to the engine to observe it, interact with all the individual parts, visually “explode” and rotate the engine without risk of injury or damage to equipment. In this XR module students will learn to identify the parts of an engine, demonstrate proper placement of an engine for repair, and be able to explain the relationship between different engine parts by doing an activity on engine timing andconnecting an engine up to a control panel.

The proof of concept modules were scoped and led by Dr. Terri Cullen, XALTER's Director of Instructional Technology. Dr. Cullen met with the Dean's and key instructors to identify opportunities to use XR to design learning experiences that could significantly improve outcomes for students.

Next, we collaborated with OSUIT to scope the remaining phases of the initiative to focus on three types of immersive learning experiences to be made available for students: virtual learning modules, virtual labs, and virtual simulators.

This would require information and requirements gathering from each of the private industry Advisory Boards that provide real-world input into the OSUIT degree plans: Air Conditioning & Refrigeration Technology, Civil Engineering/ Surveying Technologies, Construction Management, Electrical Construction, Electrical/ Electronics Technologies, Instrumentation Technology,High Voltage Line Technician, Natural Gas Compression Technologies, Pipeline Integrity Technology, Power Plant Technology, and more.

Each Advisory Board is composed of industry L&D and technical experts from companies such as Koch Industries, Weyerhaeuser, Siemens, Phillips 66, Halliburton, Hilti, ABB, Kimberly Clark, Caterpillar, Komatsu, and Toyota. The goal is to deeply collaborate with each Advisory Board to ensure that the virtual learning environment, scenarios, and tasks are highly aligned to real-world on-the-job requirements as these private industry companies also wish to leverage the virtual learning resources for their own internal employees, once the XR Integrated Curricula project is fully implemented.

There are over 100 courses to be scoped across OSUIT's various degree programs to identify optimal XR learning opportunities (virtual learning, simulations, scenarios, etc.) A product roadmap was then built to prioritize which courses receive XR learning components, based on the applicability of the courses across major and minor degrees (courses that apply to multiple degree plans would be prioritized first for development).

Next, the XR learning experiences within each course would be scoped to fit the learning objectives of that course along with the spatial setup of the room and equipment needs (the initial target hardware would include Oculus Quest 2 VR headsets).

From there, development schedules were built to leverage agile practices while gathering stakeholder input from OSUIT educators and private industry Advisory Board members. This added an additional challenge to the process as timely access and input are key to the development process, while balancing the importance of stakeholder input to ensure the final XR learning experiences were fully aligned to both the course learning objectives and private industry guidance for real-world application.

Results

The pilot program is being evaluated but initial feedback is strong and positive across all colleges. The OSUIT and broader OSU leadership and Advisory Board members are expecting measurable results from the XR Integrated Curricula initiative -- including student enrollment recruiting, learning comprehension & retention, student career preparation, and ultimately job placement.

Data already exists validating the learning advantages of XR technology and the university believes that future students will find the self-directed, immersive learning approach attractive when selecting a university. Finally, private industry believes XR will be valuable to their own Learning & Development strategies so collaboration with OSU provides a testing ground for refining their approach.

Newly appointed OSU president, Dr. Kayse Shrum has embraced the XR Integrated Curricula vision by integrating it into a major STEM initiative currently in development. It has now become a cornerstone of the learning vision for the entire OSU system.

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