



Experts say goal-oriented teaching methods, or outcome-based education, create a more cohesive learning experience, and the web-based [software tool](#) will serve as a bridge between instructor-created curriculum and program goals.

Sponsored by the National Science Foundation, Instructional Module Development System (IMOD) is currently being developed by [college](#) faculty Odesma Dalrymple, Srividya Bansal and Ashraf Gaffar. The tool will first be developed specifically for instructors teaching science, technology, engineering and math (STEM) [courses](#), but the technology can be extended for use at any level and category of learning.

Dalrymple says the program will be easy for any professor to use. The software will first help the instructor define appropriate end goals for a course while guiding the instructor through selecting instructional activities and assessments based on those end goals. Throughout designing a course, instructors will be taken through self-paced training that will provide expert guidance in developing a course around learning outcomes. Software algorithms will allow the program to query and infer new knowledge, creating a semantic program that learns as the professor uses the tool. The semantic program will in turn be able to alert the professor when selected instructional activities or assessments do not align with the defined course outcomes

The team stresses that this is not a learning management system, similar to Blackboard or eCollege. While many learning management systems provide structure, they serve primarily as an organizational tool without any support to the pedagogic methods. IMOD instead helps develop a curriculum through learning outcomes by offering resources that bring about course goals.

"Many learning management systems, if not all, are at a very abstract level. Our tool uses semantics and gets feedback from previous use of

the tool," Gaffar said. "This program is one that will transform the way education is taught in higher education."

While many courses are taught by faculty with industry experience, some faculty do not have the know-how to incorporate outcome-based learning principles into their current curriculum. Dalrymple says course design itself is no easy task, and trying to incorporate learning activities that drive specific goals is even more difficult.

"Most faculty are experts in their respective fields, but they aren't necessarily experts in education," Dalrymple said. "That's why we are creating a tool that helps faculty who don't have expertise in the curriculum design process. It takes some of the guesswork out of designing a curriculum."

The end result of using the tool will create a more cohesive learning experience for the student, while providing an enjoyable way of creating an outcome-based course, Bansal said.

Along with a group of graduate students and faculty contributors, the team is currently researching methods in outcome-based learning to include in the IMOD system. As the tool is being developed, the team will apply several user-centered design methods and techniques for more intuitive design, and will conduct usability tests to improve user experience and to determine the most effective delivery of the tool. Faculty from the college and other universities will take part in focus groups that will help shape the tool into an easy-to-use, functioning system. Students will also be involved in the design process as the team determines appropriate learning activities, assessments and pedagogy for students in various STEM concentrations.

As professors in the Engineering and Computing Systems department, Dalrymple, Gaffar and Bansal are required to design their courses

around Accreditation Board for Engineering and Technology standards, which calls for outcome-based teaching and hands-on projects. The team considers their software tool a method with which instructors can successfully integrate board standards into their [curriculum](#).

Dalrymple says the implementation of the tool at the College of Technology and Innovation will be a natural transition for [faculty](#) because the college's courses already emphasize outcome-based learning.

"That culture of hands-on [learning](#) and outcome-based assessing is already here at CTI," Dalrymple said. "We are simply bringing a [tool](#) to facilitate the propagation of that culture."

Provided by Arizona State University

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