Leveraging Technology to Enable Student Success: An Adaptive+Active Learning Approach

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Arizona State University has won the Most Innovative University award from US News and World Report for the past five years, in part, because of the investments we have made in innovative technology solutions to enable student success. For example, in 2008 we developed a pioneering administrative system called eAdvisor to improve our student advising services. It has provided hundreds of thousands of students with an integrated information dashboard to get assistance on a wide array of issues and has helped our staff provide more personalized services.

In the realm of academic technology, ASU has been a leader in the use of adaptive instructional systems in conjunction with active learning pedagogy in a flipped-class model. We refer to this as the "adaptive+active" approach. Since 2011, our faculty have used this approach to enable the redesign of more than 25 large enrollment courses in response to their persistent problems with lower student success rates (grade of C or better) and higher withdrawal rates.

Bloom's Taxonomy
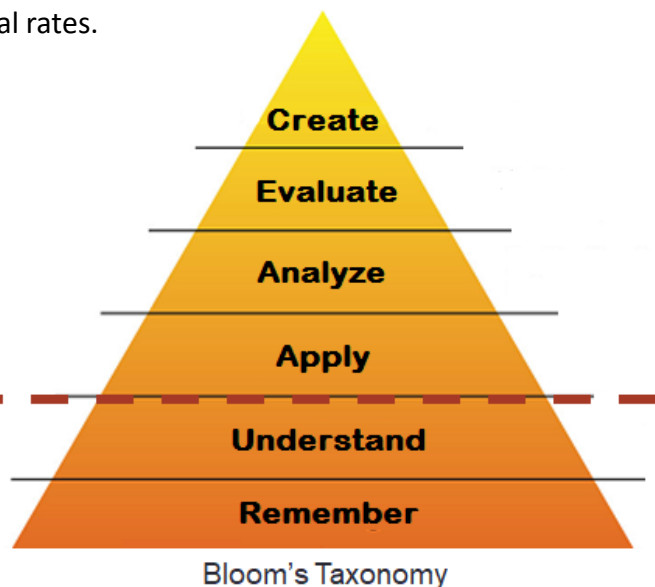
For example, in College Algebra we had tried numerous changes over the past decade to improve our student success rate including adding a developmental math course and reducing the class sizes. However, between 2011 and 2015, our fall semester success rate averaged only 61%. This contributed to lower first year student retention rates and, eventually, lower graduation rates. In the fall of 2016, our faculty implemented the adaptive+active approach, and the student success rate in that course has increased by 18% since that time.

Throughout this process, we have learned important lessons about the critical components of a successful course redesign needed to leverage technology and make this instructional approach work. Those are summarized by the following four observations:

1. Focus first on faculty development and teamwork

Adaptive+active course transformation requires a team effort. In contrast to the historical model of instructors working on their class in isolation, our most successful redesign efforts have been the product of teams of faculty in a discipline collaborating with staff members to develop the new technology and pedagogy for their course. The College Algebra redesign team consisted of seven faculty members and two instructional designers working together to create the new course. The level of complexity involved in that initial effort would have made it nearly impossible for one faculty member to scale and sustain the changes without assistance.

This teamwork provides a number of benefits. First, it allows the faculty to share the workload of creating the course learning objectives, instructional resources, and assessment activities. The effort required to design and develop an adaptive+active course is significantly greater than doing a static version of the same course in the LMS. Second, aligning the course structure and content across multiple sections and modalities helps the faculty collaborate more efficiently in the continuous course improvement process. Finally, this coordination makes it easier for both faculty and academic leaders to do learning analytics and track outcomes. Having that consistent data is critical to helping faculty identify their future opportunities for improvement.

2. Learning the new teaching process takes time

For long-term success and sustainability, we have found that it typically takes three times through the adaptive+active approach before a faculty member feels comfortable with the new technology and pedagogy. This means that both the faculty members and the department chair must commit at least two years to the process and then remain patient and persistent throughout the implementation. Some faculty members may be able to make the transformation quicker, but the general expectation should be that they will be given sufficient time to create, critique and correct their work as they master the new approach. Ensuring that there is adequate time for the necessary faculty training and development increases the likelihood of a sustainable implementation of the new course.

3. Trust the technology

For this approach to be successful, faculty must trust the adaptive technology to deliver the instructional resources and assessment activities students need to prepare for the active learning exercises in class. It is our experience that this trust can be developed in several ways. First, faculty must control the processes of configuring the curriculum, creating the content, and curating the instructional resources in the adaptive system. Having them direct the development process increases their knowledge of the final product and gives them more confidence in the system capabilities.

Second, once the system is developed, faculty should go through the entire adaptive courseware "as a student would" to ensure they know what the instructional experience will be like. Our College Algebra faculty did both of those things during their redesign process, and it helped them trust that the adaptive system would work as they expected.

4. Leadership alignment makes it all possible

Finally, we have learned that, in order to leverage technology, four levels of leadership must be aligned to enable the adaptive+active approach to succeed. The (1) faculty team members, (2) department chair, (3) dean, and the (4) provost must all agree that the transformation efforts are worth the faculty time and

financial investment. ASU focused its leadership attention on large enrollment courses with lower student success rates and higher withdrawal rates to increase the likelihood that increased benefits from higher success rates would justify the level of effort invested.

Of course, leadership alignment requires an ongoing process of maintaining communication, collaboration, and commitment among those people. For example, if a department chair changes, the support of the new leader is especially critical since that person often controls faculty course assignments. If the chair does not fully support the course redesign effort, then the faculty members may feel the process is not worth it and stop working on the program.

Final Thoughts

As you can see from these lessons learned, our experience implementing the adaptive+active approach led to the realization that leveraging technology is necessary but not sufficient to enable student success. Improving course outcomes requires a holistic approach that includes pedagogical change, persistence, patience, trust among the team members, as well as technological transformation.

What began at ASU as an effort to enable student success in our first-year math program has grown to include courses in seven different disciplines that have been taken by more than 100,000 students in the past nine years. During that time, the adaptive+active learning approach has increased student success rates in those courses and also provided our faculty and staff with new insights and expertise into designing, developing, and delivering a more successful learning experience for our students.

If the COVID-19 crisis has taught us anything, it is that we all need to work together to ensure there is flexibility in the instructional process. At ASU, the adaptive+active courses were able to transition relatively easily because all of the instructional materials were already online in the adaptive systems. While this may not be the solution for every course, we can be certain that in the future being pedagogically nimble is the new normal and that leveraging technology is critical to making that possible.

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