Case Study
Colorado State University (CSU)

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Contents

About the Contributors

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About the Supporting Organizations

Every Learner Everywhere is a network of twelve partner organizations with expertise in evaluating, implementing, scaling, and measuring the efficacy of education technologies, curriculum and course design strategies, teaching practices, and support services that personalize instruction for students in blended and online learning environments. Our mission is to help institutions use new technology to innovate teaching and learning, with the ultimate goal of improving learning outcomes for Black, Latinx, and Indigenous students, poverty-affected students, and first-generation students. Our collaborative work aims to advance equity in higher education centers on the transformation of postsecondary teaching and learning. We build capacity in colleges and universities to improve student outcomes with digital learning through direct technical assistance, timely resources and toolkits, and ongoing analysis of institution practices and market trends. For more information about Every Learner Everywhere and its collaborative approach to equitize higher education through digital learning, visit www. everylearnereverywhere.org.

Association of Public and Land-grant Universities (APLU) is a research, policy, and advocacy organization dedicated to strengthening and advancing the work of public universities in the U.S., Canada, and Mexico. With a membership of 244 public research universities, land-grant institutions, state university systems, and affiliated organizations, APLU's agenda is built on the three pillars of increasing degree completion and academic success, advancing scientific research, and expanding engagement. Annually, member campuses enroll 5 million undergraduates and 1.3 million graduate students, award 1.3 million degrees, employ 1.3 million faculty and staff, and conduct $49.2 billion in university-based research.

Introduction

Over the last 15 years, CSU has implemented Student Success Initiatives (SSI) to increase graduation rates for American Indian, Asian American, Black, Latinx, and Pacific Islander students, first generation college students, and Pell-eligible students. The University's Office of Institutional Research, Planning and Effectiveness identified foundational general education courses as key indicators of academic success for first-year students. The APLU Adaptive Courseware Grant was an opportunity to support the SSI by providing personalized learning to CSU students, and support faculty seeking to revise their courses around research-based teaching practices.

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At Colorado State University, the use of active learning and adaptive courseware, along with an intentional faculty development program, are key in the implementation of adaptive courseware.

Key Takeaways

- Executive sponsorship at the senior level within an institution plays a pivotal role in effectively rolling out plans to implement adaptive courseware.

- Faculty development is critical when implementing and scaling adaptive courseware. CSU developed various supports and practices for faculty to use throughout the process, including course design consultations with instructional designers, implementation checklists, and classroom observations.

- Implementing adaptive courseware requires an investment of time and resources. CSU used stipends to support faculty development in course redesign and additional rewards for piloting strategies, such as the Dashboard Challenge.

- When adaptive courseware, active learning, and learning assistants are employed concurrently, students achieve at higher rates.

- Features of adaptive courseware that stood out to students as the most important to their learning were chunked lesson content, solutions to problem sets, and instant feedback on mastery progress.

About the School and Grant

Colorado State University (CSU) is a four-year public research university located in Fort Collins, Colorado. Its student body consists of 34,200 students, 28,900 of which are served on-campus. 25% of CSU students are first-generation college students, and 22% are Pell grant recipients. The undergraduate student population is 70% white, 15% Latinx, 5% two or more races, 3% Asian, and 2% Black.

Colorado University was awarded the Accelerating Adoption of Adaptive Courseware Grant in 2016 to scale the use of adaptive and other innovative technologies in order to improve student success in general education courses. The grant is administered by the Personalized Learning Consortium at the Association of Public and Land-grant Universities (APLU) and is generously funded by the Bill & Melinda Gates Foundation.

Goal of the Project

A primary objective of the grant was to scale the adoption of adaptive courseware in general education courses at each of the grant institutions. CSU targeted high-enrollment general education courses, and had scaled quickly with 11,336 enrollments — just shy of the 12,300 enrollment target — within two years. The use of courseware gained momentum and by May 2020, over 40,000 students would take courses that were developed through the combination of backward design, adaptive courseware implementation, and evidence-based teaching practices.

Approach

CSU leveraged The Institute for Learning and Teaching (TILT) to support faculty through the Student Success Initiative projects and to begin the scaling of adaptive courseware. TILT houses instructional designers that are integral to bringing adaptive courseware into the classroom. TILT recruited grant faculty through those who had participated in past course redesign programs. These faculty members already demonstrated interest in student success and exploring new pedagogies, which made them strong candidates to begin piloting course redesigns that leveraged adaptive learning technologies. These faculty also acted as ambassadors for the program to help recruit more instructors.

At the start of implementation in 2016, TILT instructional designers led course redesign consultations with faculty who had been early adopters of adaptive courseware. They supported the participating faculty efforts to integrate research-based teaching practices, including high-impact or metacognitive activities. Participation in course redesign consultations was at the discretion of teaching faculty. Instances where this varied were due to the presence of course coordinators and the amount of control they exercised over course planning. Each course redesign included the implementation of adaptive courseware, dedicating a portion of class time to active learning activities, and in some cases, supporting student learning with peer learning assistants.

In addition to course redesign consultations, the TILT instructional designers facilitated faculty meetings with participating instructors to foster collaboration, enable instructors to discuss teaching strategies with one another, and recruit additional faculty. In the early stages of the grant, instructional designers assembled a checklist of all components to review and met with faculty approximately once a month. Faculty typically progressed through consultations in teams grouped by which course they were teaching. The following steps constitute each set of consultations with a participating group, team, or individual:

- Evaluate learning outcomes for the course and solidify areas of concern

- Determine whether course assessments align with stated learning outcomes

- Identify three areas in the course where students appear to have trouble or misconceptions about content

- Identify three areas as a basis to develop active learning practices for the classroom; usually 3-4 pieces of content spaced at one per month

- Add and implement courseware such that it buttresses identified active learning practices and trouble areas

Ideally, consultations took place during the semester before instructors incorporated adaptive courseware. However, some faculty underwent consultations concurrently with implementation. All faculty used vendor pre-developed courseware and, while they may have been able to choose objectives for the courses, they were not able to make substantial changes to the courseware.

TILT played an active role in keeping CSU faculty engaged throughout the grant. The Faculty Collaboration Group started to incorporate the Teaching Effectiveness Framework (TEF) and instructional designers modeled pedagogical practices for faculty that could be conducted in the classroom. Grant faculty were invited to participate in Teaching Squares and the TILT Summer Conference. Teaching Squares is a faculty development program that offers faculty an opportunity to observe other faculty in the classroom and reflect upon one's own teaching practices using the TEF. The TEF has seven domains for strong teaching and student learning: instructional strategies, curriculum/curricular alignment, classroom climate, pedagogical content knowledge, student motivation, inclusive pedagogy, and feedback and assessment.

Funds from the APLU Adaptive Courseware grant were also used to support guest speakers at three consecutive summer conferences. At the 2017 TILT Summer Conference, the university centered the theme of high-impact and research-based teaching practices, with a thought leader in the use of adaptive courseware as one of the keynote speakers. In 2018, the conference took a deeper dive into student achievement, including the impact of active learning and the science of learning. Grant faculty offered presentations detailing the use of adaptive courseware in their courses. In 2019, the conference provided the opportunity for TILT to present the TEF framework with the broader campus community. Grant participants were recognized for this work and featured as leaders as they shared their expertise in instructional and active learning strategies. After this conference, CSU aligned all faculty development programming with the TEF, including their work with the APLU grant faculty. The TEF became the basis for professional development programs and a foundation for goal setting and teaching evaluation.

To further embed adaptive courseware into the faculty teaching experience, instructional designers created the Dashboard Challenge. Courseware dashboards provide useful student data and reports but can sometimes be difficult and time-consuming to interpret. The goal of the Dashboard Challenge was for faculty to choose one dashboard report to follow during the semester and record their interventions with students. As a reward, participating faculty each received a book on interactive or collaborative learning and assessment techniques. Faculty using adaptive courseware were also incentivized with supplemental pay stipends to offset the time-consuming nature of gaining proficiency with the tool.

Relevant Findings

In Fall 2016, CSU began using adaptive courseware with 9 faculty in 51 sections, totaling 3,124 enrollments. By the next academic year, those numbers rose to 29 faculty in 82 sections, totaling 8,212 enrollments. CSU achieved scale – defined as at least 15% of general education classes employing adaptive learning courseware – in their third year of implementation, reaching 42 faculty teaching 125 sections, totaling 14,755 enrollments. At the end of Spring 2019, combined sections totaled 259 with 26,091 enrollments.
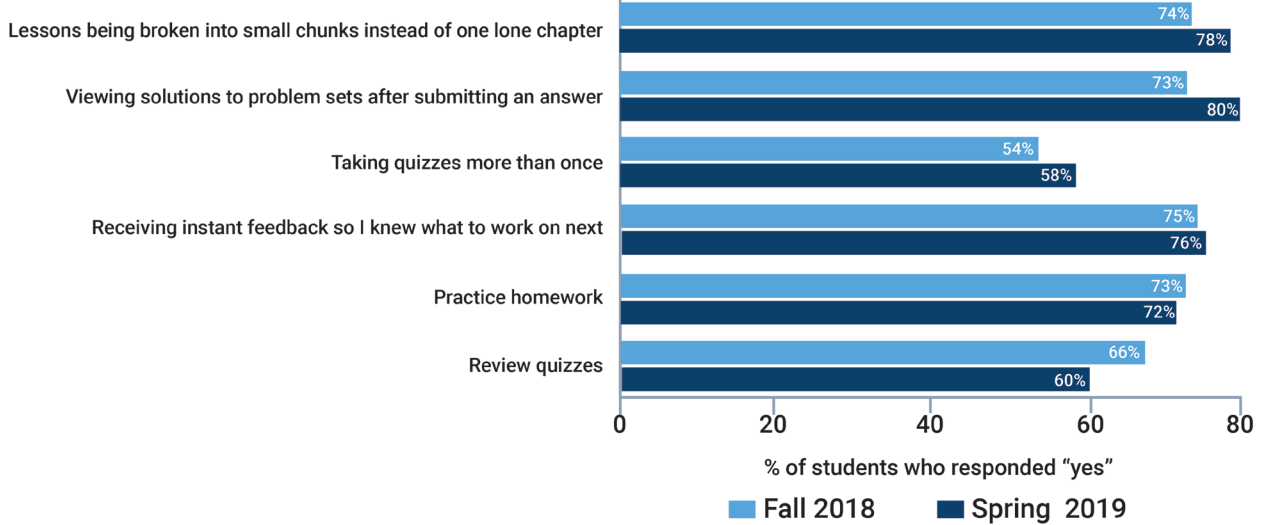
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There were a number of ways that adaptive courseware helped students. One of the benefits was the textbook savings it produced. Savings varied by courseware but students typically saved 15-25%. A majority of the students found some aspect of the courseware beneficial to their learning.

In a student survey conducted in academic years 2018 and 2019, students enrolled in classes using adaptive courseware reported the following:

ver the three years of teaching the revised version of College Algebra, Sara Clark has seen the pass rate settle into an average of 79%. One of the statistics her team is most proud of is how much they have lowered their withdrawal rate. Before the redesign, on average, 11% of students withdrew from the course during the term. That withdrawal rate now averages 4%.

These improvements generate savings for students. In the first year of the initiative, adaptive courseware redesigns produced about $1.3 million in tuition and living cost savings for students.

The following aspects of adaptive courseware helped me learn:

Aspect	Fall 2018	Spring 2019
Lessons being broken into small chunks instead of one lone chapter	74%	78%
Viewing solutions to problem sets after submitting an answer	73%	80%
Taking quizzes more than once	54%	58%
Receiving instant feedback so I knew what to work on next	75%	76%
Practice homework	73%	72%
Review quizzes	66%	60%

% of students who responded "yes"

■ Fall 2018   ■ Spring 2019

Faculty perception of courseware trended positively as well. Seven out of ten faculty felt the platform helped to better prepare students for in-class discussions and activities. Over 30% felt that there was a significant improvement in student understanding of the course material. These benefits allowed instructors to offer students a more dynamic and engaging education.

As the grant progressed, instructors were able to explore additional high-impact practices in conjunction with adaptive learning tools. One such practice that saw significant gains in student success was the inclusion of learning assistants in a pilot section of an introductory biology course called Attributes of Living Systems (LIFE 102). CSU used the Learning Assistant Alliance model, developed by the University of Colorado - Boulder, to train and support their learning assistants for this course. In this model, learning assistants take a pedagogy course to learn and research teaching methods and better understand student learning. After the course, they lead learning teams with the students in the course to encourage each member of the learning team to participate in their own learning. Learning assistants regularly meet with their lead instructor as a team to discuss how students are being engaged and to prepare for the next lesson.

Seven sections of LIFE 102 used new courseware and active learning activities while one pilot section also integrated learning assistants. The section that piloted the learning assistance model section saw statistically significant differences in student success when compared to courses using adaptive courseware facilitated by the instructor alone. In Fall 2018, the learning assistant-supported section had a 5.7% higher success rate (proportion of students earning grades of A, B, or C) for all students and a 14.4% higher success rate for students of color.

Two sections of Physics also employed learning assistants. Qualitatively, students in these sections completed homework more often, demonstrated improved reasoning, and increased the overall challenge level of homework and test questions. The success rate for these sections increased by 11% for the 2018-19 academic year. Courses combining adaptive courseware and active learning saw increased success rates. For Chemistry courses, the rate increased by 2.6% and students scored higher on the first exam than before. In Nutrition and Psychology, rates increased by 4.9% and 3.3% respectively.

Future Directions

CSU plans to hire more learning assistants to facilitate active learning in the classroom. Their learning assistants program will focus on strategies to incorporate instructional changes based on dashboard analytic reports. By having access to fundamental dashboard reports, learning assistants will be able to identify challenging topics to revisit during class and identify students who could benefit from further assistance and tutoring. These strategies are grounded in an effort to maintain high-impact learning experiences for students.

Helpful Links

If you wish to learn more about CSU's Learning Assistants program, you can view a March 2020 webinar, Supporting Students and Faculty in Introductory Gateway Courses with Undergraduate Learning Assistants.

The CSU Teaching Effectiveness Framework can be found at the TILT website, and more information about the student success and student feedback on adaptive learning can be found at TILT's Adaptive Courseware + Active Learning FA16-SP19 Internal Assessment.