Achieving the Dream™

FOCUSED EXPERIMENTS WITH ADAPTIVE COURSEWARE

A CASE STUDY OF HOUSTON COMMUNITY COLLEGE

everylearner everywhere

JANUARY 2022

ABOUT THIS CASE STUDY

Achieving the Dream (ATD) is one of 12 higher education and digital learning organizations that make up the Every Learner Everywhere (Every Learner) Network, whose mission is to help higher education institutions improve and ensure more equitable student outcomes through advances in digital learning, particularly among poverty-impacted, traditionally underrepresented and first-generation students. Every Learner partners are addressing high failure rates in foundational courses through the provision of scalable, high-quality support to colleges and universities seeking to implement adaptive courseware on their campuses. As part of its ongoing effort to help community colleges develop effective teaching and learning practices, ATD is working with seven community colleges in Florida, Ohio, and Texas on this initiative, providing coaching and direct support to the colleges, fostering collaboration within and among the participating institutions, and serving as a liaison to the Every Learner network.

The following case study is part of a series of studies conducted by ATD examining how adaptive courseware is implemented at those institutions as well as how courseware is used in particular disciplines to better serve students. Case studies are based on a series of interviews with college leaders, faculty, instructional designers, developers, technology specialists and students who were enrolled in classes using the courseware.

Acknowledgements

This case study and the underpinning work was made possible through the generous support and guidance of the Every Learner Everywhere Network. Achieving the Dream would like to thank the students, faculty, staff and administrators at Houston Community College for their dedicated work on the Every Learner Everywhere initiative on adaptive courseware and for their time and participation in the focus groups that served as a basis for this case study.

We would also like to thank ATD Director of Program Development, Dr. Ruanda Garth-McCullough, for leading ATD's Every Learner Everywhere work with the support of ATD staff Susan Adams, Francesca Carpenter, Eric Fiero, Cheryl Fong, Jonathan Iuzzini, Sarah Kinnison, Dr. Richard Sebastian, Dr. Tanya Scott, Paula Talley and Dr. Monica Parrish Trent as well as former ATD staff members, Joanne Anderson, Shauna Davis and Shanah Taylor.

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Achieving the Dream. (2021). *Focused Experiments with Adaptive Courseware—A Case Study of Houston Community College*

OVERVIEW

Faculty at Houston Community College (HCC) led efforts to implement adaptive courseware in introductory mathematics and economics courses, as well as leverage tutoring programs to provide a model for additional support for both students and faculty.

- The initiative was faculty led, with instructors in multiple disciplines determining which courseware to use in their classes.
- Integrating faculty-led tutoring provided additional opportunities to both support students and introduce faculty members to adaptive technology.
- Institutional supports included collaborative efforts to develop course shells and onboarding modules, later led by a part-time instructional designer who collaborated with faculty on course design.

- Faculty reported that courseware implementation led them to take deeper looks at pedagogy and their use of data and other digital learning tools to promote student success.

SUPPORTING INSTITUTIONAL REFORM

The Every Learner initiative supports broader efforts to foster student learning with evidence-based practices, including efforts to support the development of students' mastery of concepts and critical thinking skills. "Our faculty members are deeply committed to improving student success and providing greater support to our traditionally underrepresented or socioeconomically disadvantaged students to address equity gaps," says HCC Chancellor Cesar Maldonado, Ph.D., P.E. "Their involvement in evaluating and implementing adaptive courseware reflects efforts at all levels of the institution to use technology to improve teaching and learning." The initiative also reflects the contexts in which broader institutional reform is taking place at community colleges throughout the ATD Network, including building a culture of excellence in teaching and learning and leveraging data and technology to support student success and equitable student outcomes. To learn more, see p.7.

HOUSTON COMMUNITY COLLEGE
DATA SNAPSHOT[1]

LOCATION Houston, TX

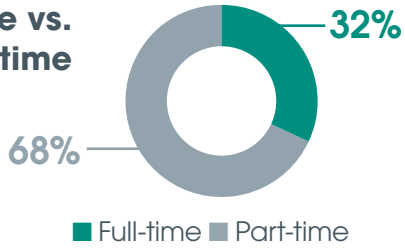
TYPE Suburban

LOCATIONS (Campus/Centers) 16

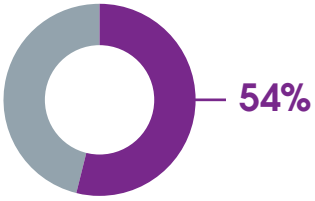
ENROLLMENT
56,151

GENDER
FEMALE **60%**
MALE **40%**

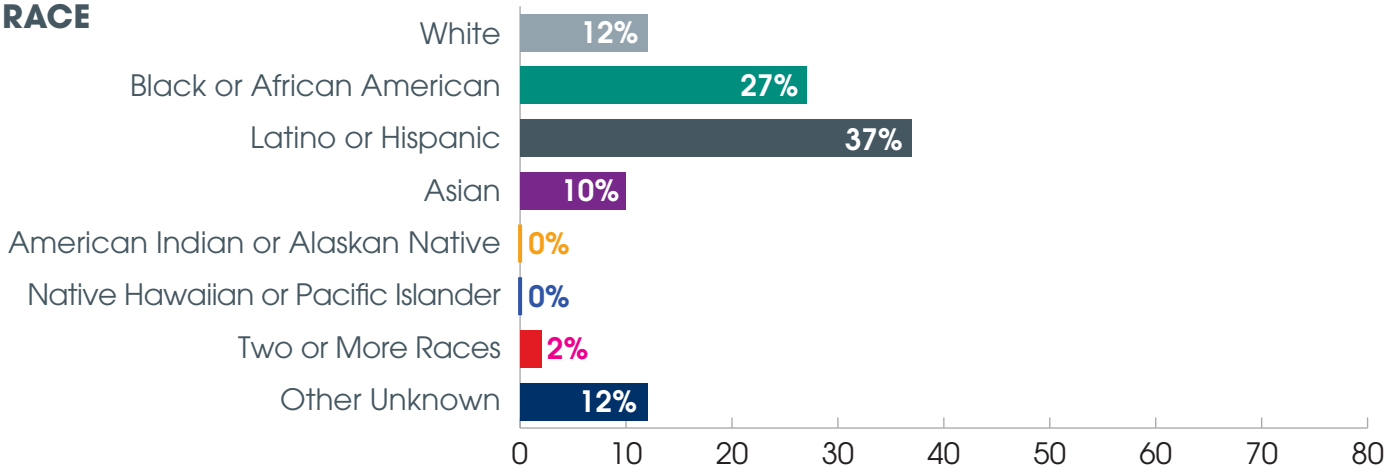
Full-time vs. Part-time



Pell-grant recipients



RACE



ATD MEMBER STATUS

JOINED ATD
2004

ATD ACHIEVEMENTS
ATD Leader College (2009)

ELE INFORMATION

Discipline	Courses	Sections	Students	Full-time Faculty	Adjunct Faculty	Courseware
Math	College Algebra (MATH 1314	6	163	4	0	Knewton Alta (Wiley)
	Math for Business and Social Sciences (MATH 1324)	2	58	1	0	Knewton Alta (Wiley)
Economics	Principles of Macroeconomics (ECON 2301)	8	298	3	0	Waymaker (Lumen)

1 The information contained in the Data Snapshot is based on data from the National Center for Education Statistics' College Navigator, data collected directly from the institution, and information maintained by ATD.

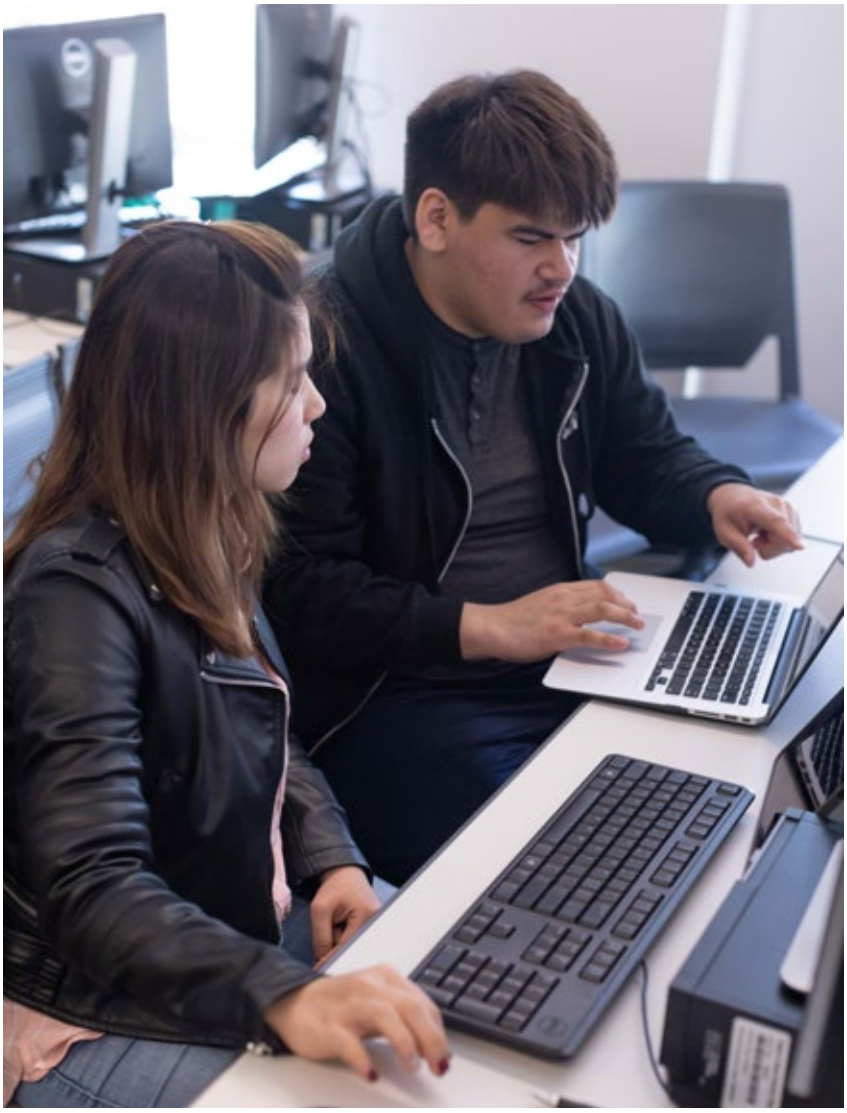
INTRODUCTION

Ivan Ondoa readily admits his first experiences with adaptive courseware at Houston Community College (HCC) felt "weird." He hadn't used online tools in class before, but quickly learned to value the opportunity to do additional work for college algebra until he mastered key concepts.

"As the year progressed, I got used to it," says Ondoa, who plans to transfer to a four-year college and study architecture. "My professor would go over the things in class, but it wasn't in-depth like it was in the homework. That is how you'd understand what he actually taught you."

Improving student engagement and "time on task" outside of class were among the goals driving HCC's efforts to integrate adaptive courseware into some of its largest enrollment courses, including college algebra and introductory macroeconomics. Participating faculty saw benefits in giving students supportive opportunities to practice and master key concepts—something that students like Ondoa quickly recognized as they became familiar with the technology.

"The courseware was extremely forgiving," he says. "You can make mistakes, and it won't penalize you until you get it right, and you can go over and over it until you do."



A FOCUSED EXPERIMENT

Faculty saw the Every Learner initiative as a "way to experiment with using technology to improve student success," says Dr. Nathan Smith, philosophy faculty member and coordinator of HCC's Every Learner and Open Educational Resources (OER) efforts.

As part of ongoing institutional initiatives, HCC had looked at its 10 largest enrollment courses and focused on integrating high-impact practices, says Dr. Andrea Burridge, associate vice chancellor of research, analytics, and decision support.

Math was immediately identified as an area where adaptive courseware could have the greatest impact. The department was already phasing in a corequisite model as a result of state legislation and had focused on a range of other improvements, including professional development for faculty and advisors to adopt the new model and better prepare students for it. Within this evolving context, college algebra "jumped out to us" as an option for adaptive courseware, Smith says. Faculty felt strongly that the benefit would be greatest on the credit-bearing side. Given the persistent equity gaps among traditionally underrepresented students in this course, "it was a place where we could potentially gain some ground and impact a lot of students," Smith says.

HCC provided an important array of supports as faculty began evaluating and implementing the technology. Several faculty members attended summits sponsored by Achieving the Dream and Every Learner and collaborated with peers at other institutions who had implemented adaptive courseware, and faculty held internal meetings as they piloted adaptive tools. HCC also hired a part-time instructional designer to work with faculty to build out model course shells for each participating course. The process could ultimately evolve into a more robust professional learning model for onboarding faculty, Smith says.

BUILDING ON ATD'S CORNERSTONES OF EXCELLENCE

Like other community colleges participating in the Every Learner grant which are part of the ATD Network, HCC has committed to engaging in bold, holistic, and sustainable institutional change across multiple institutional areas and priorities. The institution's efforts to implement adaptive courseware reflect the importance of several key cornerstones of institutional change, including building a culture of excellence in teaching and learning and leveraging data and technology to support student success and equitable student outcomes. "Driving the evaluation and use of the very best adaptive courseware and ensuring best practices across our programs is paramount to our students' success," said Chancellor Maldonado.

ATD's Institutional Capacity Framework and Institutional Capacity Assessment Tool (ICAT) outlines seven essential institutional capacities required to create a student- focused culture that promotes student success. One focuses specifically on teaching and learning and the commitment to engaging full-time and adjunct faculty in examinations of pedagogy, meaningful professional development, and a central role for faculty as change agents within the institution. Building capacity in this area is particularly crucial because, as ATD President Dr. Karen A. Stout recently asserted, "focusing on teaching and learning is still not central to the field's overall theory of change. We still have much more to do to build a deep focus on pedagogy and to support our colleges in building a culture of teaching and learning excellence."

To foster this culture of teaching and learning excellence, *ATD's Teaching & Learning Toolkit: A Research-Based Guide to Building a Culture of Teaching & Learning Excellence* is centered on four cornerstones of excellence that provide a forward-looking vision that campuses can use to inform their work.

Initiatives such as Every Learner provide important resources and supports to community colleges and the time, space, support, and resources to explore innovative pedagogical approaches to improving student learning and outcomes. They also offer sustained opportunities to build on these cornerstones of excellence. HCC's work with the initiative exemplifies the importance of institutional efforts to empower faculty to consider, adapt, test, and refine new approaches to fit their campus context and the needs of their students, including identifying courses in mathematics and economics which serve large numbers of students and have had historically low completion rates "where we could potentially gain some ground and impact a lot of students," says Dr. Nathan Smith, a member of the philosophy faculty and coordinator of HCC's Every Learner and OER efforts.

This commitment builds on broader efforts to integrate and scale technology in ways that support evidence-based instructional practices that fostered student learning, including OER and low-cost Z-degree programs. "Every class you teach should have an online component," says economics professor Lawrence Paye. "You can't do the same thing over and over and expect different results."

The Every Learner grant also provided faculty with opportunities for professional learning that supported ongoing improvements in pedagogy. "Faculty got a huge benefit out of rethinking their courses in new ways—they talked about interpreting data and being more adaptive in pedagogy," Smith says. "That's going to pay dividends beyond this pilot."

EXPLORING MULTIPLE MODELS

Some participating instructors began using adaptive courseware in a flipped classroom model, one in which students did homework in the courseware before coming to class for discussion and review of its concepts. However, faculty discovered the approach resulted in unintended consequences.

"We found that students spent less time in the system and were much less successful—they were frustrated," Smith says. "The model the instructors came to was more traditional—presenting the material first and then going back and addressing things students were struggling with."

In most courses, adaptive courseware would ultimately be used as an "add-on," with faculty directing students to the technology for homework or additional practice beyond standard assignments, according to Dorsetta Williams, manager of HCC's Center for Teaching and Learning Excellence. Some took the approach of assigning adaptive work as extra credit to encourage students who needed the extra time on task.

In math, most of the college algebra sections which used adaptive courseware were taught by a professor who also taught the supporting developmental course, providing an additional level of support and skill-building beyond the technology. "We found the model works best when you have the same person teaching both," says Dr. Susan Fife, mathematics program chair.

The economics department joined the Every Learner initiative later in the pilot. Faculty had already experimented with OER and some individual faculty members had experimented with implementing adaptive courseware in microeconomics. Faculty members like Lawrence Paye set up the courseware to require students to complete adaptive work in one module before moving on to the next—which also translated to higher participation and pass rates.

"Creating a prerequisite worked like a charm," Paye says. "Previously, most students would attempt to take the exam before they had done all of the homework, and when they did, they didn't do well." The number of students in his course earning As and Bs doubled, he says.

Paye also used reports from the courseware to identify key concepts where large numbers of students were struggling or to support individual students who were falling behind. "Many students are shy—they don't want their peers to know they don't know that information," he says.

THE STUDENT EXPERIENCE

For many HCC students, adaptive courseware wasn't just an alternative to a textbook—it was the textbook. Some were taking Z-course sections, so named because adaptive courseware intentionally replaced textbooks as zero or low-cost learning materials, but even in other courses, many students reported an additional learning curve as they used digital learning tools for the first time to supplement classroom instruction.

"It was difficult at first, but once we got the hang of it, it became very easy to use," says business management student Selene Hernandez, who used adaptive courseware in consecutive sessions of micro and macroeconomics.

Students stressed the value of professors taking the time to introduce them to the technology, although the extent to which they did so varied from class to class. "My professor took two whole class days to go through where everything was, which was extremely helpful," Ivan Ondoa says of his college algebra class.

Importantly, students said that onboarding helped them understand why they had to keep working through concepts in the courseware until they mastered them. "When I was really stuck on a problem, I couldn't skip over it—I had to solve it to move on," says nursing student Alessa Escalante Ledezma. Hernandez agrees, crediting the adaptive assignments with "making sure you have to learn the information and apply it to the rest of your assignments."

"If you did the work and kept up with it, it helped you because you learned more," adds Tito Ramirez, who is studying political science.

Students said that adaptive work was generally aligned with what they were doing in class, but agreed that more in-class connections would be helpful. "If the instructor pulled more content out of the courseware to discuss in the class, (it would) give you a total understanding," says Fugi Thompson, who is majoring in accounting.

They also said they would benefit from faculty members monitoring their work within the courseware more closely to understand where they were struggling. "If professors would have checked up on us to see how well we were learning the material, it would have been helpful to have that encouragement," says Ledezma. "They could see if (students) are learning the information they're supposed to be learning instead of just doing the work to get the grade."

In the end, none of the students wanted to go back to physical textbooks. "By now, we're used to doing things online instead of having a physical copy of the book," says Ledezma. "I've adapted."

COLLABORATION WITH TUTORING

Coordinators engaged HCC's tutoring department early in the planning stages of the Every Learner grant. With 14 tutoring centers geographically dispersed throughout HCC's service area, efforts began by including managers of each center in the planning process for the courseware rollout.

The vast majority—about 80 percent—of HCC tutors are faculty members, and one full-time tutor was invited to participate in the planning process and subsequently train math tutors in different centers.

Tutors were trained to ask students if they were using courseware in the classes for which they were seeking help, and then examine the students' efforts directly inside the courseware in order to "bring a different level of intentionality," says Burridge.

While the numbers of students who took advantage of tutoring were low, tutors reported that those who did were more focused, according to Burridge. The partnership also opened the doors for greater collaboration with tutoring centers—and participating faculty members—going forward. Because tutoring is so predominately led by faculty, organizers hope that adaptive technology's use in tutoring centers will in turn help them understand how it can be used in their classrooms.

"If faculty are not involved in teaching a course with adaptive courseware, the best training is seeing exactly what the student is going through so they can have a better understanding of where they are," Burridge says.

ADAPTIVE COURSEWARE IN PRACTICE: SUCCESSES AND CHALLENGES

What Worked Well:

Engagement. Faculty and students agreed that adaptive courseware helped students master complex concepts. "A lot of adaptive courseware is designed in a way that explains concepts that students easily understand compared to other textbooks," says economics professor Lawrence Paye. Student Fugi Thompson noted that the courseware "gave you more insight. It gave me the option to read at my own pace, study the information, and attempt to reapply it."

Onboarding. Every Learner coordinators Dr. Nathan Smith and Dorsetta Williams developed an onboarding module that was integrated into courseware shells. The content of the module was "geared towards getting students and faculty to think about how adaptive courses are different, how expectations are different, and how faculty will be teaching differently," Smith says.

Students credited the onboarding modules with helping them adjust to adaptive work but reported that faculty members took very different approaches to in-class onboarding—from not mentioning it at all to two full class days introducing students to the technology.

Instructional designer Harun Yilmaz is also revising onboarding modules to promote additional faculty adoption. "It's not too long but very useful in terms of understanding how students benefit," he says.

Customizability. Faculty selected courseware in large part based on its ability to select objectives and adjust sequencing, according to Smith. One alternative was "too rigid and locked them into a sequence of instruction they weren't comfortable with," he says.

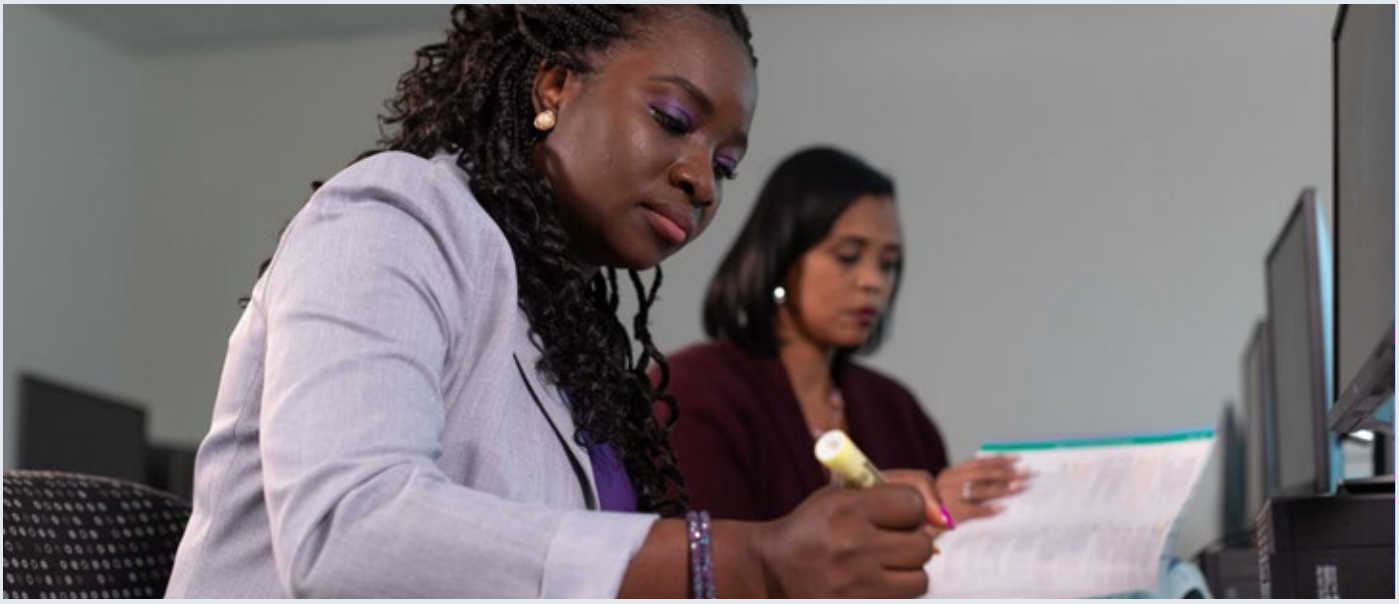
Collaboration with publishers. Courseware publishers and their representatives worked closely with faculty to develop adaptive materials for courses.

Meeting student needs. Students coming to HCC out of high school were familiar with and wanted to continue using technology in their learning, according to Dr. Andrea Burridge, associate vice chancellor of research, analytics, and decision support. "We hear from our younger students that it's a shock when they come into college and there's not as much technology instruction taking place," she says. "It's what they're accustomed to."

Ongoing Challenges:

Faculty professional learning. While HCC offered online training for interested faculty, many of the reported challenges with implementation, including faculty members who dropped out of the pilot, resulted from limited familiarity with the technology. Project leads acknowledged the need for more robust training. "If anyone wants to implement the courseware in the future, hopefully we can guide them a bit more," Smith says.

Formative uses. While faculty used reports from courseware to identify where students were spending more time in the system or struggling with concepts with varying degrees of success, some struggled with using student work as a formative tool. "One math faculty member said 'I don't understand why students are getting 100 percent on their homework'—which meant they were completing that (assignment)," Smith says. Some faculty said the reporting made it difficult to identify student performance levels. "The only thing that gives me a sense of whether a student truly struggled is the time that is spent" in the courseware, says Branson Brade, mathematics professor and program coordinator. "I don't know if I got a good feel of my students' true ability." To further his understanding, Brade conducted in-person assessments to understand where students were having challenges.



Students, too, often had trouble recognizing that adaptive work was "a support tool, rather than an extra to do along with their homework," Williams says.

"Starting off was a challenge because it made you really read and reapply the content," says Thompson. "Once you got used to how it worked, it got easier." Student Ivan Ondoa agrees, calling the work "tedious" at times—"but I understood why it was there," he adds.

Progression. Students and faculty recognized the value of needing to finish one concept before moving on to the next one in adaptive courseware—"when I was really stuck on a problem, I couldn't skip over it. I had to solve it to move on," says student Alessa Escalante Ledezma. At the same time, faculty found that some students didn't progress rapidly enough in the courseware and struggled as a result. "Sometimes students get frustrated because of the time required to get to the level of mastery," says Brade. "Some benefit greatly from the approach, whereas for others it destroys their motivation. I've been thinking about whether there's a way to identify those students beforehand. It may just come down to letting students know early on that it's an adaptive course and give them some choice."

Pacing. As at other institutions, faculty struggled to make sure students completed adaptive work on time. "A number of students left it alone and towards the end there's a rush to finish," Brade says. To that end, he added a second due date halfway through the semester to encourage students to stay on track, then opened those assignments back up during the final two weeks to give students who missed the initial deadline the opportunity to make up the missed work.

Formatting. Students and tutors agreed that at times courseware flagged responses as incorrect if the formatting, such as the number of decimals, wasn't exactly what was expected by the courseware. "There's a bit of frustration," says Amanda Guerrero, HCC director of instructional support, who oversees tutoring programs.

Alignment. Some faculty members reported gaps between their course objectives and learning outcomes in the adaptive courseware. Some used supplementary resources to help students, and Yilmaz stresses the importance of helping faculty zero in on learning objectives in planning and using adaptive courseware. "Course outcomes talk about the higher level, but the learning objectives focus more narrowly on the defining and understanding levels in Bloom's taxonomy," he says. "There's some disconnect there."

LESSONS LEARNED

Keys to HCC's implementation of adaptive courseware:

- **Addressing institutional fatigue.** The Every Learner Everywhere grant was part of a "constellation" of grants and initiatives, and the pilot's scope was intentionally limited in part as a response to the "dizzying" sense of "everything going on" and the fact that targeted courses also were the focus of other institutional projects, says Dr. Andrea Burridge, associate vice chancellor of research, analytics, and decision support.

- **Identifying areas of potential overlap.** Faculty identified significant areas of overlap with other initiatives, including OER and Z-degree programs, which could benefit from greater faculty immersion in digital learning tools. "Every class you teach should have an online component," says economics professor Lawrence Paye. "You can't do the same thing over and over and expect different results."

  At the same time, math faculty were intentional in separating adaptive courses from other initiatives, including paired corequisite courses in which the technology wasn't used. "There was a real need to separate out the different projects in order to try to understand the effect of each one so we could invest in the ones with the most effect for the students," Burridge says.

- **Thinking about scaling from the beginning.** A common onboarding module for students and efforts to create common course templates for faculty represented intentional efforts to create opportunities for future scaling of courseware.

- **Identifying tutoring as both support for students and training for faculty.** Despite low participation rates, faculty members recognized the potential benefits of including adaptive courseware in tutoring. Given the large number of tutors who also teach courses at HCC, the use of adaptive in tutoring also was seen as a way to broaden faculty exposure to the technology, even though initial efforts lacked training support. "The way you can make it more effective is to give tutors more understanding of adaptive coursework," says Paye, who also served as a faculty tutor.

- **Recognizing the conditions needed for scaling,** including buy-in from faculty leadership. "To be successful, pilots need to be intentionally integrated into a department's priorities," says Dr. Nathan Smith, a philosophy faculty member and OER coordinator. "If it's not, it's hard to maintain focus and enthusiasm."
- **Encouraging faculty experimentation.** Economics joined the pilot in large part because of the interest of individual faculty members. "It's good to do trials," says Dr. Susan Fife, mathematics program chair. "If you have faculty who want to try something, they should be encouraged to do so."

CONCLUSION

Anecdotally, students using adaptive courseware did as well as or better than peers who did not, but coordinators believe data from Spring 2020 weren't representative given the challenges of the pivot with the pandemic. The shift to remote teaching during the pandemic also complicated efforts to iterate and improve early pilots, according to Smith.

As individual faculty members continue to become more proficient with courseware, HCC coordinators hope its role in their classes deepens. "We hope now that we've had a bit more experience with it, instructors will design around it and use it for re-teaching, not just as an extra add-on," Williams says.

To fully scale the use of courseware, however, will require a more integrated approach in which department leadership coordinates faculty efforts beyond "a few willing faculty willing to try something new," Smith says.

"We've seen some limited success—not a quantum leap, but some people have been happy with it," he explains. "We don't have an answer yet on whether this is where we want to go."

Even so, the initial efforts to use adaptive courseware will contribute to broader shifts in teaching and learning, according to Smith. "Faculty got a huge benefit out of rethinking their courses in new ways—they talked about interpreting data and being more adaptive in pedagogy," he says. "That's going to pay dividends beyond this pilot."

Achieving the Dream™

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