THE UNIVERSITY OF TEXAS RIO GRANDE VALLEY:

Adaptive Courseware for Early Success Case Study

ASSOCIATION OF PUBLIC & LAND-GRANT UNIVERSITIES

The University of Texas Rio Grande Valley

every learner everywhere

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The 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. The association's membership consists more than 250 public research universities, land-grant institutions, state university systems, and affiliated organizations. APLU works with members to expand access and improve student success to deliver the innovative workforce of tomorrow; advance and promote research and discovery to improve society, foster economic growth, and address global challenges; and build healthy, prosperous, equitable, and vibrant communities locally and globally. The association's work is furthered by an active and effective advocacy arm that works with Congress and the administration as well as the media to advance federal policies that strengthen public universities and benefit the students they serve.

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 **everylearnereverywhere.org.**

Building upon previous course redesign efforts in mathematics, the University of Texas Rio Grande Valley (UTRGV) brought mathematics and statistics faculty from multiple campuses together to strategically align their efforts to effectively integrate adaptive courseware in Elementary Statistics and College Algebra courses. An active faculty community approach was employed to align instructional practices and eliminate unnecessary course content that was overburdening students. Faculty professional development and undergraduate teaching assistants were further integrated to improve applications of dashboard analytics to further support student learning.

ADAPTIVE COURSEWARE FOR EARLY SUCCESS INITIATIVE

The Adaptive Courseware for Early Success (ACES) Initiative was a grant-funded initiative supported through the Every Learner Everywhere network and funded by the Bill and Melinda Gates Foundation. In total, thirteen colleges and universities from Ohio, Texas, and Florida participated in this initiative from 2019 through 2021. Six 4-year universities, which are members of the Association of Public Land-grant Universities (APLU) received direct guidance and support from the Personalized Learning Consortium (PLC), located in the Office of Digital Transformation for Student Success (DTSS). The ACES Initiative centered around two primary goals:

- **To redesign critical gateway courses taught by faculty committed to integrating equity-centered, evidence-based teaching practices that are enhanced by adaptive courseware**

- **To create more equitable student outcomes by improving learning and educational experiences for poverty-impacted students, racially minoritized students, and first-generation students**

Over the course of two and a half years, the PLC provided intensive coaching, peer-mentorship, collaborative learning and networking opportunities, and educational resources and training to cross-functional, institutional teams at select institutions. These institutions received further support and benefits from the Every Learner network partners, including Achieving the Dream and Digital Promise who offered collaborative learning with participating two-year institutions and program evaluation support, respectively.

Note. It is critical to acknowledge that this initiative took place at the onset and height of the COVID-19 global pandemic crisis. The COVID pandemic dramatically altered the higher education landscape in 2020, requiring colleges and universities to rapidly transition to remote instruction and to reprioritize the allocation of their resources and institutional capacities to appropriately respond to the crisis. Despite facing these challenges, each of the participating institutions carried on their work, adapting in real-time and focusing on how to best leverage newly adopted technologies and supporting students with quality teaching practices. For more information on the impact of COVID on these grantees and other institutions, please see our network partner Digital Promise's report, *Suddenly Online: A National Survey of Undergraduates During the COVID-19 Pandemic.*

The University of Texas Rio Grande Valley Demographics

26,800 undergraduate students and **4,800 graduate** students

4-year public research institution across the **Rio Grande Valley region**
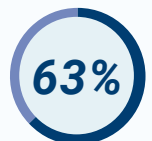
The university was created in **2013,** merging campuses of the University of Texas System.

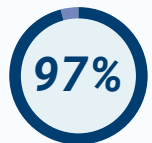Unlike many colleges, UTRGV **increased** their student enrollment yearly during the pandemic.
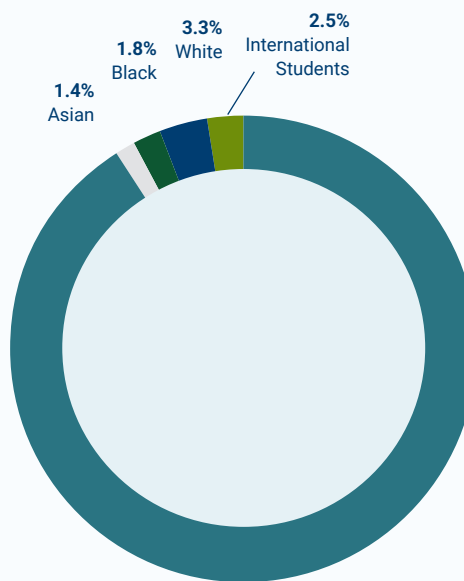
92% of all students are Rio Grande residents.

63% of undergraduate students are eligible for a Pell Grant.

As of fall 2020,

97% of undergraduate students were enrolled in at least one online course, with **64% enrolled exclusively online.**

1.4% Asian

1.8% Black

3.3% White

2.5% International Students

91% Hispanic/ Latinx

(UTRGV is one of the largest Hispanic-Serving Institutions [HSI] in the U.S. and the largest in the University of Texas System.)

Student Demographics

Institutional Background

UTRGV's inaugural strategic plan outlined four core priorities that included student success (UTRGV, 2015). Part of this focus included improving retention and graduation rates, and the university sought to decrease high drop, fail, withdraw (DFW) rates in high-enrollment courses. For mathematics gateway courses, the School of Mathematical and Statistical Sciences had attempted multiple approaches to decrease DFW rates, including emphasizing cooperative learning, promoting a growth mindset for learning math, and using the adaptive product, ALEKS (Assessment and Learning in Knowledge Spaces), for homework assignments.

From 2017-2020, UTRGV participated in the Student Engagement in Mathematics through an Institutional Network or Active Learning (SEMINAL) grant initiative. Funded by the National Science Foundation and with support from APLU, the SEMINAL grant supported nine institutions in expanding the adoption and implementation of active learning strategies in mathematics courses to support student learning and student success (Smith et al., 2021). For that initiative, UTRGV prioritized the integration of active learning practices within two introductory calculus courses. Through these efforts, the School of Mathematical and Statistical Sciences increased their course coordination across calculus sections and supported student success for those students taking these classes.

With the ACES Initiative, UTRGV saw an opportunity to build off their SEMINAL experience with some overlapping faculty participants, including Dr. Tim Huber, who led the mathematics faculty through course coordination during this grant process. The institution also wanted to further train faculty members on using real-time analytics to support students' individualized academic needs. Specifically, they wanted to focus on students in their JumpStart program, a 5-week summer bridge program. JumpStart Scholars are newly admitted first-year students at UTRGV who have completed fewer than 26 credit hours in a college setting and who are working towards meeting the state-mandated Texas College Ready standards. JumpStart scholars also take corequisite courses during the fall and spring semesters to supplement their academic learning. Since adaptive courseware includes prerequisite materials to build foundational knowledge, UTRGV felt that the integration of an adaptive product in the JumpStart courses could especially benefit these students.

Goals of Grant Participation

The primary goals for UTRGV's involvement in the ACES Initiative were to increase retention and graduation rates by focusing on improving DFW rates in gateway mathematics courses. They were also interested in enhancing communication and alignment among faculty on course design and in identifying ways that learning analytics available through adaptive courseware might enable faculty to better address individual student needs.

Course Implementation

UTRGV decided to redesign their Elementary Statistics and College Algebra courses because of their higher DFW rates and high impact, as a majority of undergraduate students take these two classes. The institutional team also wanted to create a common syllabus and curriculum to standardize the student experience across the sections with JumpStart scholars. Faculty members who had previously taught these sections were asked to participate in the initiative.

Designated course coordinators and a faculty project lead were tasked with facilitating the faculty community and its efforts at aligning instructional efforts across multiple sections of each course.

Both courses used the adaptive product, ALEKS, hosted by McGraw Hill, as the mathematics department was already familiar with using ALEKS for homework assignments (Table 1). During the first semester of implementation in fall 2019, the UTRGV team used dashboard data and found that students were having trouble completing all the assigned course materials (Baker, 2020). After further review, they realized that the courseware simply consisted of too many online modules. By centering students' learning needs and identifying which concepts were critical for students to achieve competency across both courses, the faculty removed unnecessary and redundant course materials for all subsequent semesters. In addition, undergraduate course assistants were added to select sections to aid faculty by monitoring student progress and providing peer support.

Table 1.

Course Implementation of Adaptive Products at UTRGV

Discipline	Course Name	Adaptive Product	Students	Faculty
Mathematics	College Algebra	ALEKS (McGraw Hill)	559	11
	Elementary Statistical Methods	ALEKS (McGraw Hill)	1,112	11
Totals	**2**	**1**	**1,671**	**14** (With some faculty teaching across multiple courses)

 Note: *Final data as reported by the university in fall 2019, spring 2020, fall 2020, and spring 2021.*

Implementation Challenges

UTRGV experienced some challenges during the process of implementing adaptive courseware for the ACES Initiative. Given UTRGV's short history as an institution, faculty members had experienced many changes in both personnel and structures. They have also recently been involved in several different initiatives. Dr. Frederic Zaidan III, who serves as the Senior Associate Dean for Academic Affairs and Student Success, as well as the Project Lead for this grant's implementation team, described the "history and change fatigue" faculty members likely were experiencing:

> *We became UTRGV by combining the personnel and other assets of two universities down here separated by 60-something miles. And there's not a main campus, there's not a branch campus. Instead of most places having 2 buildings within 60 yards of each other they're now 60 miles. We've gone through a lot of change for most of us who were around at the legacy institutions to now. There are also numerous upper-level administration changes. We also have a new dean coming in. People were tired."*

Even with this fatigue, the implementation team was quite ambitious in the project's first semester, noting that they may have actually tried "to do too much." They adjusted accordingly in subsequent semesters by reducing the content in the courses and adding undergraduate course assistants to support faculty with class facilitation. The course assistants checked on student progress during class instruction and supported faculty members with technical support like managing the virtual chat and helping break up the students into groups. Dr. Frederic Zaidan III described how this was especially important given UTRGV's increasing student enrollment, which led to larger class sizes:

> *Larger classes when students are struggling with the concepts is just really counterproductive. So, having more and more students in there to help out is going to mitigate some of these issues we're facing. If we don't have the student course assistants, this will also be a problem. Especially when dealing with the adaptive courseware because we do want to continue working on this."*

Technology Access.

In addition to managing increases in student enrollment, UTRGV found that their students had issues with accessing technology during the COVID-19 pandemic, when classes were largely taught remotely. An institutional survey in spring 2020 found that around 30 percent of student respondents did not have access to a laptop or tablet. The students that did have these devices often experienced difficulties with connecting to the internet. UTRGV tried to provide solutions on campus for students, but Dr. Zaidan described these options as underused:

> *Computer labs remained open. Those were available and students really weren't utilizing them. We increased the wi-fi coverage in the parking lots. There were laptops available to check out, but this also was an underutilized resource. So, it just didn't seem that there was a whole lot of change between those that could get on [the internet]."*

Several participating institutions developed new practices to address student access and equity issues in ways they had not prior to the pandemic. While some provided direct support through the provision of laptops or tablets, others established WIFI access points across the campus, so that students could safely access the internet and their course materials from campus parking lots or other outdoor areas. We recommend institutions should always consider how they can best support students through policies, practices, and provision of resources to center student needs and ensure more equitable access.

Impact of Adaptive Learning Implementation

Student Average Course Grades.

For this project, student outcome data was analyzed and compared to outcomes from the same courses across semesters. However, several courses were not part of the analysis due to a lack of sufficient sample size (at least 30 students per group needed) or lack of baseline equivalence between student groups in comparison semesters (no more than 0.25 standard deviation difference). Outcomes from both courses in fall 2019 with adaptive courseware were compared to those of fall 2018 without adaptive courseware. When controlling for students' prior academic achievement, Pell eligibility, race, gender, age, enrollment status, and repeater status, there was no statistically significant impact of the adaptive courseware on the outcome of student course grades.

The same analysis was conducted in fall 2020 for College Algebra, and no significant difference was found for model-adjusted course grades compared to previous semesters. Student outcomes from Elementary Statistical Methods were not analyzed in fall 2020.

Additional Improvements.

Through the implementation process, faculty members developed a community of practice in which they increased collaboration and were motivated to revise introductory courses in the mathematics department. Dr. Tim Huber, the Director of the School of Mathematical and Statistical Sciences, spoke of this improvement:

> *I think it's also the communities we've developed. The faculty, we're talking to each other more. There's new faculty coming into the department, and they see this going on and they realize there's other people interested in the success of students. The department is interested in the success and the university is. All of this is really on display in this initiative and in all of the other things that we're doing."*

Dr. Huber further stated how this increase in collaboration will eventually lead to higher student success in math at UTRGV:

> *I think that we benefited from the push to coordinate, to talk to each other. And I think that will have an impact beyond just this grant and beyond just the courses we're focusing on. So, I think it will amount to more student success and more progress. I'm looking for ways to continue the funding that we received from APLU for course assistants and some of the other things that we started through this initiative. I really think students benefited [and] faculty benefited because of the community that this has helped build."*

Lastly, Dr. Huber described how the inclusion of undergraduate course assistants aligned with initiatives elsewhere on campus and affirmed the importance of peer mentors:

> *I think we're seeing the impact not just here but in other courses that used peer-led learning. [UTRGV] has a program called PLTL, Peer-Led Team Learning. And this initiative that [Dr. Zaidan] and I are involved in [has] some of the same components [where] we're involving peers of the students who've already taken the course and done well."*

Takeaways and Next Steps

From their involvement with the ACES Initiative, UTRGV had two primary takeaways revolving around faculty involvement and how much course content to include.

1. Including everything in a course may need to be restrained to effectively use the courseware.

- It can be a common challenge among some disciplines to ensure that introductory courses cover the appropriate content required of students. This can be further complicated by national or state level requirements for content coverage.

- When implementing technology such as adaptive courseware, faculty must take into consideration student engagement with course content and assessments to ensure that students are not being overburdened or distracted with unnecessary content.

   i. Looking at student engagement data with course materials and collecting student feedback is a critical strategy for understanding students' experiences, so that faculty may make course design and curriculum choices that most benefit students.

   ii. The vendor is a resource for fully understanding how content is scaffolded within the product. Faculty may need to work with the courseware provider to restructure materials and ensure that the functionality of the adaptive system is not lost.

2. The faculty must be champions of the courseware efforts if the students are to succeed.

- To effectively do this, faculty must be sufficiently resourced by the institution to ensure quality integration of courseware into their redesigned courses. This may include:

   i. Support and recognition at the departmental-level and by academic leadership.

   ii. Provision of appropriate resources such as instructional design support, sufficient time to participate in professional development, opportunities to engage in a faculty learning community, teaching assistants, and/or appropriate classroom settings such as active-learning rooms or laboratory spaces.

   iii. Institutional commitment to ensuring that resources such as technology infrastructure, access to affordable and accessible materials, and supports for student success such as tutoring and advising are effectively integrated.

- Engaging with students to collect, acknowledge, and act on their feedback is critical to students feeling validated and knowing that their needs are being considered in the implementation choices of educational technologies such as adaptive courseware.

The implementation team also recognizes the importance of integrating other improvement efforts with adaptive courseware. Moving forward, they hope to expand adaptive learning to other mathematics courses and collect impact data on adaptive courseware adoption to face-to-face courses. UTRGV also has several long-term goals such as securing funding to scale adaptive courseware implementation in additional mathematics sections, find campus space for a mathematics laboratory to house adaptive courseware courses, sustain and grow the teaching assistant peer-mentorship model, and expand implementation to other departments that have high-enrollment core courses.

References

Baker, P. (2020, September). Using data and an iterative approach to revise course content in college math. *Every Learner Everywhere*. https://www.everylearnereverywhere.org/blog/revise-course-content/

Smith, W.M., Voigt, M., Ström, A., Webb, D.C., & Martin, W.G. (2021). *Transformational change efforts: Student engagement in mathematics through an institutional network for active learning.* American Mathematical Society and CBMS.

The University of Texas Rio Grande Valley [UTRGV]. (2015). *Transforming our world: Strategic plan.* https://www.utrgv.edu/strategicplan-2015/