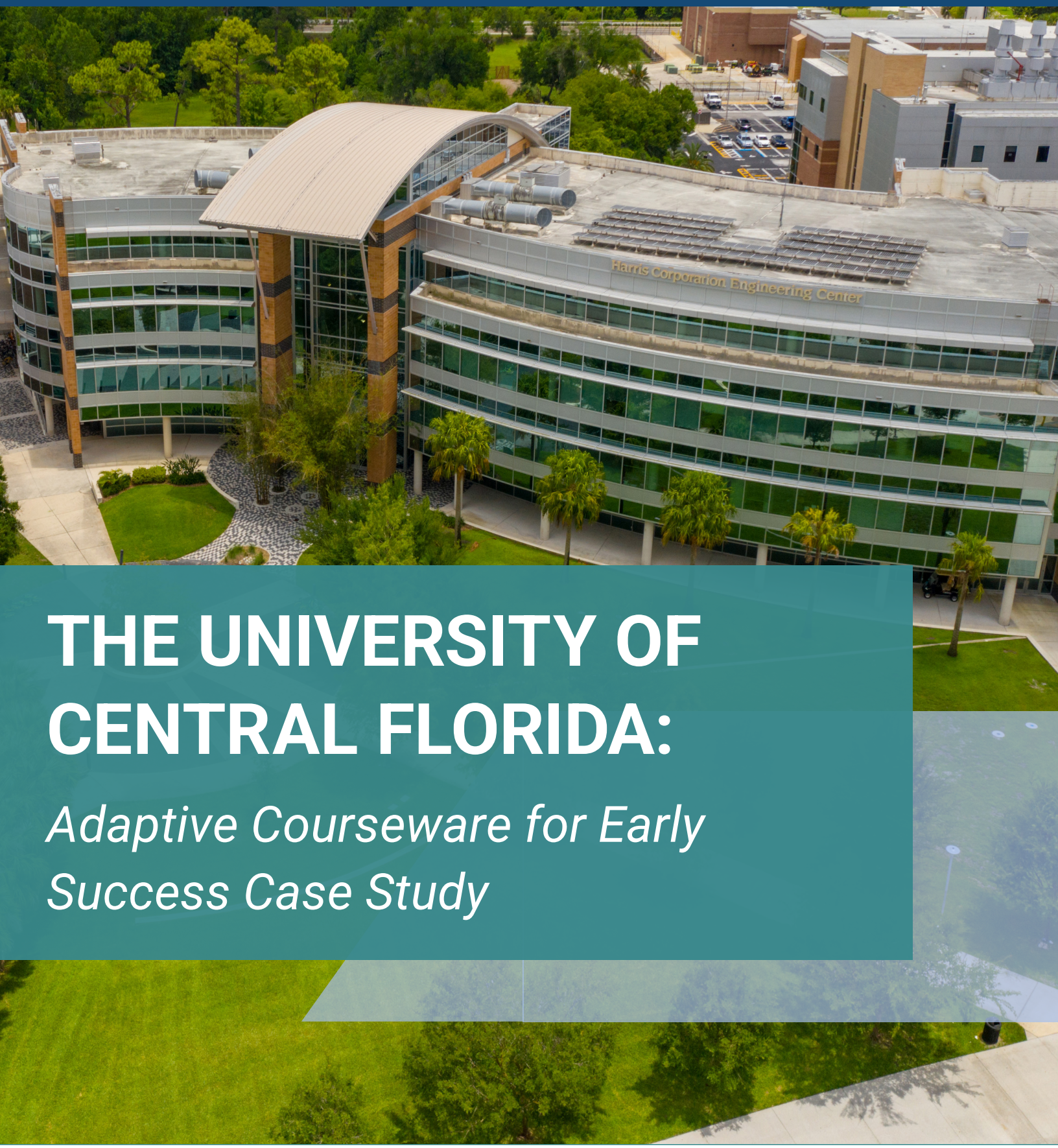

THE UNIVERSITY OF CENTRAL FLORIDA:

Adaptive Courseware for Early Success Case Study

Association of Public & Land-grant Universities

UCF University of Central Florida

everylearner 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.**

Association of Public & Land-grant Universities

everylearner everywhere

Building on existing resources and faculty support programs, the University of Central Florida (UCF) refined their adaptive courseware implementation programs. With the success of a highly coordinated faculty team in Spanish, UCF was also able to further scale adaptive course redesigns among new faculty and courses within the foreign languages department.

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 Central Florida Demographics

59,000 undergraduate students and **9,200 graduate** students

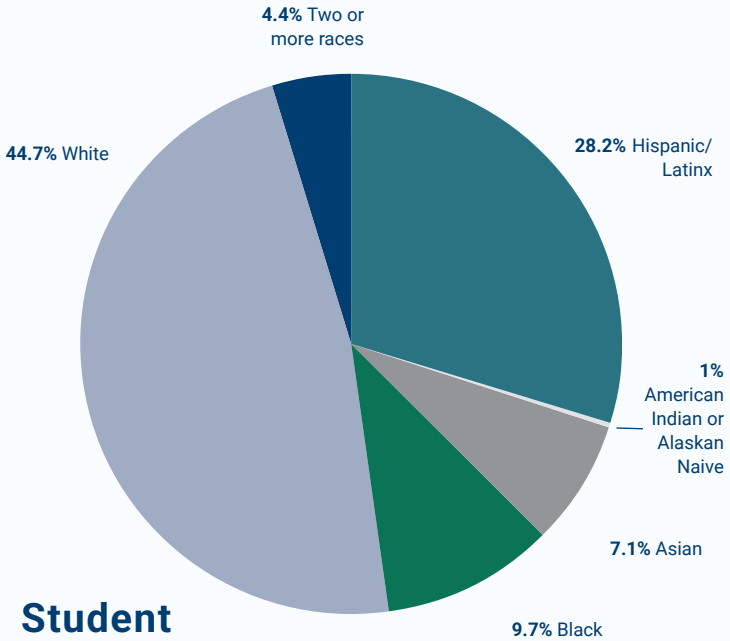
4-year public research institution in **Orlando, Florida**

UCF is designated as a Hispanic-Serving Institution (HSI).

49% of undergraduate students are eligible for a Pell Grant.

As of fall 2020,

80% of undergraduate students were enrolled in at least one online course, with **44-59% enrolled exclusively online.**



Student Demographics

Institutional Background

UCF has actively and strategically worked to scale its implementation of adaptive courseware since 2014. The Personalized Adaptive Learning (PAL) team within the Center for Distributed Learning facilitates the design and development of adaptive learning courses through training and professional development for faculty members.

In fall 2018, the Division of Digital Learning and the Division of Student Learning and Academic Success were funded by UCF's Board of Trustees to implement the Digital Learning Course Redesign Initiative (DL CRI). Other offices involved included the Pegasus Innovation Lab (iLab) and the Center for Distributed Learning (CDL), which both support online education at UCF. The 3-year initiative was designed to increase student completion rates in gateway courses, increase classroom utilization for faculty members, and improve student retention and success. To accomplish these goals, UCF looked to redesign 50 courses, mainly general education and STEM (science, technology, engineering, mathematics), into online or blended instruction, as well as another 50 courses into adaptive learning. They also sought to transform eight traditional classrooms into technology-enhanced active learning spaces and provide additional professional development to up to 120 faculty members (Pegasus Innovation Lab, 2022).

By the end of the Digital Learning Course Redesign Initiative in spring 2021, 140 courses were redesigned, and 46 of those courses now incorporate adaptive courseware. 103 faculty members have been trained in online instruction and eight active learning classrooms were completed in 2020. In assessing the initiative, 95 percent of participating faculty members reported that the DL CRI was very helpful, and several redesigned courses resulted in increased student completion rates. Forty-four adaptive courses increased the percentage of students who received a letter grade of A, B, or C. Twenty-one of these courses were fully online, and 14 courses were blended (Pegasus Innovation Lab, 2022).

Goals of Grant Participation

Participating in the ACES Initiative gave UCF the opportunity to supplement their existing work with the DL CRI and progress their goal of improving efforts at scaling adaptive learning throughout the university. UCF developed strategies at the course-level to replicate in other departments and the team set a goal of replacing textbooks in Spanish courses with open educational resources (OER). Through their involvement in the ACES Initiative, UCF hoped to connect with other institutions and resources to explore best practices for adaptive learning implementation and scale.

Course Implementation

In addition to the expert guidance that they received from UCF's Center for Distributed Learning, UCF instructors informed their implementation process by learning from faculty and program managers at other institutions with experience in adaptive learning, along with support from APLU through the ACES Initiative. The PAL team, led by Program Director, Dr. Baiyun Chen, facilitated the instructional design and courseware integration support to faculty.

Spanish

In 2018, both Elementary Spanish Language & Civilization I and II were redesigned by instructors Anne Prucha and Kacie Tartt, as part of the Digital Learning Course Redesign Initiative. The redesign focused on incorporating an OER OpenStax textbook into RealizeIt. The revised course was launched as a pilot in spring 2019 using the RealizeIt adaptive product.

Physics

The physics department sought to incorporate adaptive courseware in their courses to encourage students to rely less on short information sheets for learning and focus more on answering questions to test knowledge. Senior Lecturer Archana Dubey worked with an instructional designer between fall 2018 and summer 2019 to redesign College Physics by incorporating OER content from OpenStax into the RealizeIt adaptive product. Two sections were piloted in fall 2019.

Table 1.

Course Implementation of Adaptive Products at UCF

Discipline	Course Name	Adaptive Product	Students	Faculty
Physics	College Physics	RealizeIt	1,131	1
Spanish	Elementary Spanish Language & Civilization I	RealizeIt	493	2
	Elementary Spanish Language & Civilization II	RealizeIt	416	1
Totals	**3**	**1**	**2,040**	**3** (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

Throughout the implementation process, UCF emphasized the amount of time and resources it takes to effectively integrate adaptive learning into a well-designed course–knowledge they've gained through their extensive Digital Learning Course Redesign Initiative. Dr. Wendy Howard served as the institution's project lead for the ACES Initiative and was the Director of the Pegasus Innovation Lab. She noted how their "*biggest challenge has been trying to determine how best to scale up to program level implementations in order to justify the level of effort required on the front-end to implement RealizeIt.*" UCF has committed substantial resources to implementing adaptive courseware across the university, with offices dedicated to supporting faculty members who want to incorporate the learning technology. Additionally, the Digital Learning Course Redesign Initiative led to nearly 50 additional courses integrating adaptive learning.

However, even with these extensive supports, a significant amount of effort was required of faculty members to redesign their courses in a substantial way. While the use of open educational resources provided faculty with a greater freedom to adjust course content at any time, it also took more upfront time and effort to help curate, build, and implement the customized adaptive learning product. Additional effort was also required by faculty and supporting departments once the redesigned courses were live, to continue improving upon and sustaining those courses. One Spanish faculty member described these continuous efforts:

> ***"We need to be able to continue demonstrating results and positive impact on students in order to get more faculty in the department to buy into this initiative. Resources needed for this include another course assistant to work with us to improve even more the content that we are delivering, adding audio components, items for pronunciation practice, etc."***

Data and Analytics

Data and analytics provided by the adaptive product supported participating faculty to more closely engage with their students. Specifically, the Personalized Adaptive Learning team played a substantial role in helping faculty both access and use the platform data. A physics instructor noted how they modify their adaptive questions and reading content each semester depending on evolving student needs using the data and analytics they now had access to:

> ***"Looking at students' questions in class and their performance on exams and quizzes, or questions in office hours, PAL assignments and reading content is now modified on a regular basis. This was not possible when I was using a homework system, such as webassign."***

Project Lead, Dr. Howard, described that the participating faculty were now frequently using formative learning assessments in their teaching. Additionally, after seeing improved student outcomes, the Spanish faculty "*even further embraced the adaptive platform for this group of digital natives.*" In the faculty's own analysis of redesign efforts, they saw improvements in student pass rates (A, B, and C grades) in both Spanish I and Spanish II courses, with increases of student success from 74.5 percent to 85 percent in Spanish I and 78 percent to 95 percent in Spanish II. Data and analytics were vital in helping participating faculty see how their informed teaching practices were positively impacting their students in real-time.

A top goal for UCF was determining how to scale up the future integration of adaptive courseware across academic programs at the university. They acknowledged the large investment needed by the faculty, instructional designers, and the institution to make this possible. To further assist these efforts, they worked to optimize the resources and support available through adaptive product vendors. It is important for institutions to leverage resources provided by adaptive product vendors through training and consultations to understand all potential features and product capabilities (Holiday et al., 2020). Even with all the resources UCF puts in to make this possible, additional resources such as those provided through vendors can supplement institutions in further scaling innovations such as adaptive learning.

Impact of Adaptive Learning Implementation

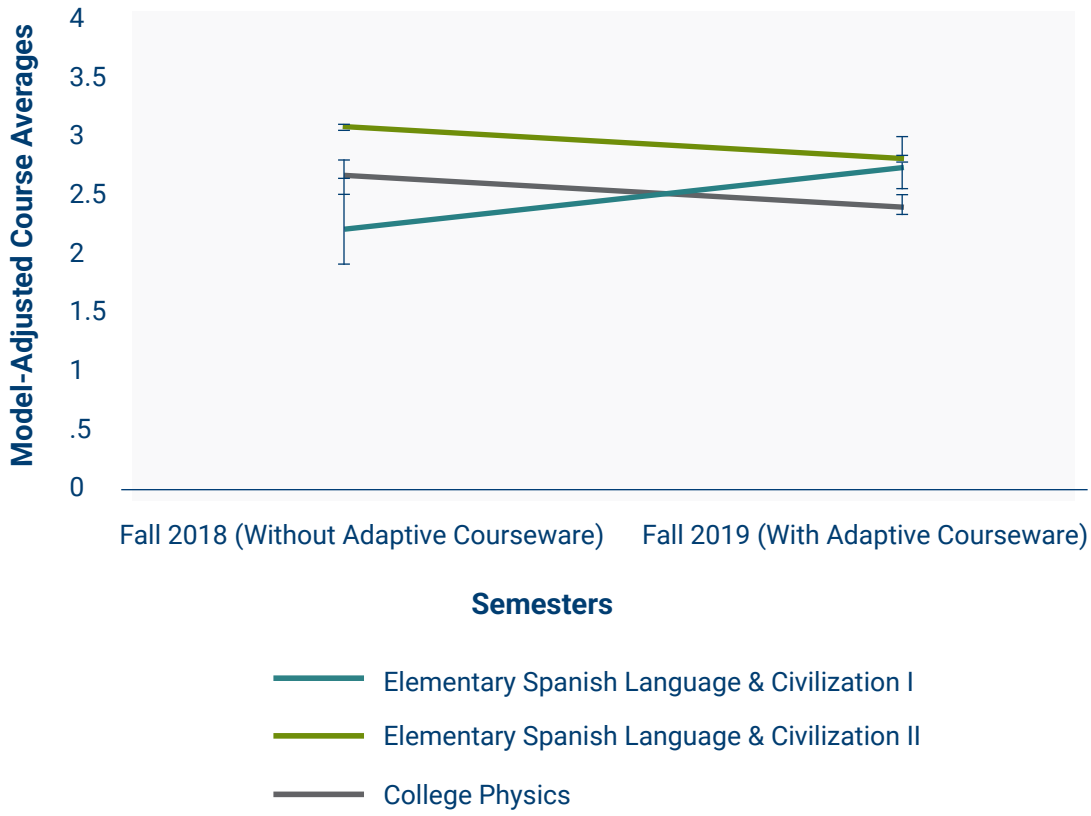
Student Average Course Grades.

To assess the impact of the initiative, Digital Promise analyzed and compared student outcome data from the same courses across multiple semesters. However, some courses were not included in 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). In fall 2020, no course met these requirements. In spring 2021, only College Physics met the analysis threshold. The grade averages were adjusted for prior academic achievement, Pell eligibility, race, gender, enrollment status, and repeater status. When controlling for these factors, there was a positive increase in course grade for students taking College Physics in spring 2021 with adaptive courseware (n=2.92) compared to students taking the course in spring 2020 with adaptive courseware (n=2.76). However, the finding was not statistically significant. Additionally, spring 2020, fall 2020, and spring 2021 took place during the COVID-19 pandemic, which likely affected the results.

In fall 2019, all three courses met the analysis threshold and were compared to the same courses in fall 2018 taught without adaptive courseware. While the impact of adaptive courseware was not significantly different from zero (no impact) for Elementary Spanish Language & Civilization II and College Physics, model-adjusted course grades were significantly different for the students taking the Spanish course with adaptive learning compared to students taking the course in fall 2018 without adaptive courseware (Figure 1). The sections with adaptive courseware had a mean grade (m=2.92) about 0.32 standard deviations higher than that of the sections without adaptive courseware (m=2.33), when adjusting for student differences.

Figure 1.

Average Model-Adjusted Course Grades Across All Students in Fall 2018 and Fall 2019



Additional Course Improvements.

The faculty members involved in the ACES Initiative described how the integration of adaptive learning enhanced student learning. Findings across institutions involved in the grant showed that faculty changed their institutional practices to integrate more collaborative work and improved applications of adaptive learning (Digital Promise, 2022). The physics instructor at UCF discussed their class dynamic before the integration:

> ***"When I was not using [adaptive courseware], I used to repeat several things in class in the hope that students [would] listen and remember, and it would help them learn. I am using [adaptive courseware] for an introductory large enrollment, algebra-based physics class. It is difficult to make sure that everyone is listening when I am lecturing. Even if students are paying attention, [they] may not grasp everything covered during the class."***

After the course redesign, they felt more connected with student levels of understanding and how to directly support their learning needs. The instructor was able to modify the course content on a regular basis based on student performance.

> *"Using [adaptive courseware] makes sure that every question not just reaches the students but is also answered by the students. I can add a variety of questions, which helps students improve their understanding of the subject. I can ask the same questions in different ways/styles to check if students are understanding. Answering the questions asked in a variety of ways helps students get a clear view of the physics idea being taught and understand better."*

One spanish faculty member echoed the benefit of being able to better meet students where they are and the importance of data to increase faculty buy-in.

> *"By showing data and positive results this can continue to be cultivated within the languages and any discipline for that matter. We don't need to simply accept what a publishing company can offer. We can address our own needs and create a better path to acquisition and retention for our students!"*

Faculty members were empowered to design their course content based on their expertise and current student engagement in the classroom. Their use of OERs, along with the adaptive learning, further enhanced this flexibility, while still holding students accountable for their own learning. The physics instructor stated the balance provided by the integration of adaptive learning:

> *"As a teacher, I want to do everything so that my students learn and excel in the subject. At the same time, I want my students to also put effort into learning the material, and I am achieving this goal by using [adaptive courseware]."*

Takeaways and Next Steps

UCF had several takeaways from their experience implementing adaptive courseware:

1. **Moving beyond a faculty-by-faculty pilot approach and toward program-level adoptions is critical to scaling quality teaching practices and student success.**
   - **Buy-in from faculty program cohorts and departmental leadership is important to solidify before attempting to integrate adaptive courseware into a program.**
2. **It can take up to two years to complete a full course development and redesign; do not rush the process. Continuous improvement and ongoing refinement are vital in the course design and development processes.**
3. **Adaptive learning can and should be effectively applied and improve courses outside of STEM, such as foreign language programs.**
4. **Data and analytics are essential in effectively teaching with adaptive courseware and can provide faculty with more information about student learning so that faculty may better meet students' learning needs.**
5. **Documenting and measuring impact is critical to securing the buy-in necessary to expand and scale courseware integration across programs and an institution.**
   - **Leverage successes and support the faculty who made those successes possible. Amplify their learnings and celebrate their successes.**

Moving forward, UCF plans to continue integrating adaptive learning in six new courses through a Course Redesign Extension project. They'll continue to partner with vendors and external support services to supplement their efforts and aid faculty in ongoing courseware implementations. They also hope to scale existing courses with adaptive learning across multiple sections and instructors within the same programs. With documented improvements and positive experiences amongst participating faculty, UCF plans to grow faculty adoptions among Spanish faculty and expand within their Foreign Languages department.

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