ASSOCIATION OF
PUBLIC &
LAND-GRANT
UNIVERSITIES

A GUIDE FOR IMPLEMENTING ADAPTIVE COURSEWARE:

FROM PLANNING THROUGH SCALING

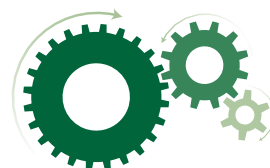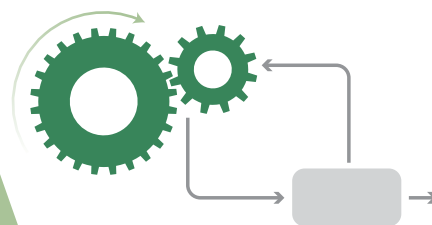OCTOBER 2018

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WHO WE ARE

This guide was developed by the Personalized Learning Consortium of the Association of Public and Land-grant Universities in partnership with Every Learner Everywhere at the Western Interstate Commission for Higher Education.

The **Association of Public and Land-grant Universities (APLU)** is a research, policy, and advocacy organization representing 237 public research universities, land-grant institutions, state university systems, and affiliated organizations. Founded in 1887, the APLU is North America's oldest higher education association with member institutions in all 50 U.S. states, the District of Columbia, four U.S. territories, Canada, and Mexico. Annually, member campuses enroll 4.7 million undergraduates and 1.3 million graduate students, award 1.1 million degrees, employ 1.3 million faculty and staff, and conduct $41 billion in university-based research.

The **Western Interstate Commission for Higher Education (WICHE)** is a regional organization created by the Western Regional Education Compact and adopted in the 1950s by Western states. WICHE was created to facilitate resource sharing among the higher education systems of the West but is also involved in a number of activities at the national level, including WCET and Every Learner Everywhere. The **WICHE Cooperative for Educational Technologies (WCET)** is the leader in the practice, policy, and advocacy of technology-enhanced learning in higher education. WCET is a national, member-driven nonprofit that brings together colleges, universities, higher education organizations, and companies to collectively improve the quality and reach of technology-enhanced learning programs.

WCET is pleased to be the intermediary organization supporting **Every Learner Everywhere (Every Learner)**. Every Learner Everywhere deploys a network-centric approach to connect the experts in the field, align around a shared vision, produce effective solutions to increase student success and completion, and eliminate the equity gap that exists in higher education. Every Learner Everywhere currently comprises 12 partners that are actively engaged in the research and development of practices that leverage digital technology to enhance the teaching and learning experiences.

PREFACE: THE ORIGINS OF THIS GUIDE

This guide was created by the Association of Public and Land-grant Universities (APLU) and Every Learner Everywhere (Every Learner) with the generous support of the Bill & Melinda Gates Foundation.

DEVELOPING SHARED BEST PRACTICES AROUND THE IMPLEMENTATION PROCESS

Institutions of higher education (IHEs) understand that in order to stay competitive and meet the needs of an increasingly diverse student body, they must create new and more flexible learning opportunities. In recent years, a number of technology solutions have entered the higher education market with the potential to change learning experiences and improve student outcomes. While not every experience with new technology has been a success story, some educational technology innovations have shown encouraging potential.

Among the technologies gaining traction today are *adaptive learning solutions*, which help deliver a personalized learning experience to each student. One of the most promising forms of adaptive technology is adaptive courseware, and IHEs are implementing adaptive courseware to support a range of institutional goals, including:

- Increased course completion.
- Increased student engagement.
- Greater course flexibility and access.
- Greater opportunity for student self-remediation.
- Reduced variability between sections/instructors.
- Reduced equity gaps.
- Lower costs for instructional materials.

WHAT ARE ADAPTIVE LEARNING SOLUTIONS?

Adaptive learning solutions take a data-driven and, in some cases, nonlinear approach to instruction and remediation. These solutions adjust based on each learner's interactions and performance to anticipate the learner's needs at a specific point in time. (Adapted from Learning to Adapt 2.0, Tyton Partners, 2016)

WHAT IS ADAPTIVE COURSEWARE?

Adaptive courseware is a digital instruction tool that provides a personalized learning experience for each student. It includes instructional content and assessment that is scoped and sequenced to support an entire course.

DOES IT WORK?

Institutions are reporting that adaptive courseware is helping them achieve a range of goals. However, the research base is still being developed.

Despite growing awareness and discussion of the potential *outcomes* related to using adaptive courseware, there is little available on the *process* that might be used to implement it effectively. This is in part because each implementation of adaptive courseware is unique and varies based on the institutional context, courses targeted, and courseware products used. This has made it difficult to develop best practices that translate from one implementation to another. Furthermore, institutions generally work through implementations on their own without the intention of documenting their process to share with others. As a result, resources that analyze the process of implementing adaptive courseware are sparse, and the learning curve for institutions seeking to implement adaptive courseware remains steep.

In 2016, the APLU launched a grant program with the support of the Bill & Melinda Gates Foundation aimed at accelerating the adoption of adaptive courseware by public universities. This program awarded grant funding and support to eight public universities that agreed to adopt, implement, and scale adaptive courseware to at least 15% of their general education course enrollments by the end of the three-year grant period. Grant goals included improving student success in general education courses and, in particular, leveraging adaptive courseware to better support low-income students, students of color, and first-generation students.

Now two years into the grant, the grantee institutions, referred to in this guide as *partner institutions*, have refined their approaches to take a transformative learning initiative from an idea, to a pilot, and toward scale. By design, the partner institutions have worked as a cohort on this project, regularly sharing their findings and challenges with one another and the APLU. This has allowed the institutions to learn from one another's experiences to help accelerate progress toward their scale goals and improve their implementations of adaptive courseware. This document aggregates what the eight institutions have learned from their individual implementations in order to help other institutions move along the implementation learning curve more quickly.

The partner institutions that contributed to this guide are the following:

- Arizona State University (ASU)
- Colorado State University (CSU)
- Georgia State University (GSU)
- Northern Arizona University (NAU)
- Oregon State University (OSU)
- Portland State University (PSU)
- University of Louisville (UL)
- University of Mississippi (UM)

The partner institutions began accelerating their use of adaptive courseware as part of the grant program in January 2017. The data reported as of the release of this guide include all semesters through August 31, 2018. Cumulatively, the eight institutions report reaching nearly 75,000 course enrollments in sixteen disciplines. The disciplines where adaptive courseware has been implemented include: biology/life sciences, business, chemistry, economics, engineering, English/composition, government/political science, health sciences, history, mathematics, modern languages, philosophy, physics, psychology, rhetoric/writing, and sociology. Over half of the enrollments reached are in biology, chemistry, math and psychology courses. Across the partner institutions, there is experience with fourteen adaptive courseware vendors. The institutions report that students' cost of materials in the sections using adaptive courseware is lower than the cost of materials in nonadaptive sections.

The data on student outcomes, while promising, are limited. We have collected 18 months of data, but given a limited number of enrollments during the pilot phase, it is difficult to draw conclusions and cumulative statistics on student success. The institutions are, however, reporting on their individual data and many have very powerful positive statistics about improved course success. We are updating the individual institutional data regularly and welcome you to visit the PLC webpage to see the latest reports at the university level.

TRANSFERRING OUR BEST PRACTICES TO YOUR INSTITUTION

It is clear from our partners' experiences that implementing adaptive courseware is a significant undertaking that requires an investment of human resources, time, and money. Therefore, this guide aims to help institutions navigate that complicated process by providing:

- A logical process for implementation, organized into six phases.
- Specific resources and activities to help institutions navigate each phase.
- Guidance on how to build support for the initiative and how to involve key stakeholders in the implementation process.
- Case studies from partner institutions that demonstrate important takeaways.

This guide is designed to share the best practices and tips uncovered through real implementations of adaptive courseware. We believe the implementation model and tips presented in this guide are useful for IHEs of all shapes and sizes, though the context may be most familiar to large, public institutions like the partner institutions. In addition to sharing institutional experiences, the guide also aggregates a variety of resources and tools to guide your implementation.

The eight partner institutions are using adaptive courseware in different contexts, however, they all implemented adaptive courseware in foundational courses taken by students early in their undergraduate experience. We believe that these courses present major opportunities to positively impact overall student success rates given their high number of enrollments and their potential to act as barriers to progress for many students. It is our hope that this guide will be useful no matter which courses you choose to redesign for an adaptive courseware implementation.

A FOCUS ON FOUNDATIONAL COURSES

Foundational courses are those taken primarily by first- and second-year undergraduate students. Research shows that success in these courses is related to overall student success. If students struggle in foundational courses, they are more likely to drop out of their programs.

Partner institutions in this project implemented adaptive courseware primarily in foundational courses that were part of their general education requirements. These institutions have the goal of expanding adaptive courseware to 100% of target course sections during the project.

INTRODUCTION

BENEFITS OF ADAPTIVE COURSEWARE

Adaptive courseware is a digital instruction tool that provides personalized learning experiences for each student. It includes instructional content and assessment that is scoped and sequenced to support an entire course. Adaptive courseware provides faculty with data about each student's progress and learning needs so that instruction and pedagogy can be modified in real time to improve student success. The result is that students are able to get the content or activity that they need, when they need it.

Adaptive courseware analyzes student data and can adapt elements of the instructional content, activities, and assessments based on the student's performance. As a result, each student takes a customized path through the course material based on how he/she is interacting with the software (e.g., answers/inputs, time spent on tasks, assessment results). If you would like to learn more about adaptive learning solutions, we recommend exploring resources developed by Tyton Partners and EDUCAUSE.

TYPES OF ADAPTIVE COURSEWARE

Adaptive courseware is available in many forms with a range of options for customization and configuration. We've identified two ends of the product spectrum: off-the-shelf courseware and custom-build adaptive platforms. There is a wide range of products that fall in between these two ends of the spectrum, many of which allow or require some level of customization prior to course delivery.

OFF-THE-SHELF COURSEWARE	CUSTOM-BUILD ADAPTIVE PLATFORMS
These solutions are typically sold by course title and function as a textbook replacement. They have ready-to-use content delivered via an adaptive platform. Off-the-shelf courseware typically does not allow for much customization of content or assessment.	These solutions are adaptive learning platforms that allow users to build or import all of the course content and assessments. These solutions typically allow for integration of original content, commercial content, and open educational resources. Vendors offering these adaptive platforms often provide course-development services to help customers build their courses.

HOW ADAPTIVE COURSEWARE IS USED

Adaptive courseware is a flexible tool that can be used in many different ways to support instruction in a variety of courses. Adaptive courseware is sometimes used as a component of a course—for example, as a homework tool, as a textbook replacement, or to deliver supplemental practice—but it can also deliver the content and assessment of a full course. Adaptive courseware is used across disciplines and in a variety of classroom environments—face-to-face, online, flipped, and blended courses.

No matter how an institution chooses to integrate adaptive courseware into a course, this new technology has the powerful potential to shift the learning experience for students and the instructional experience for faculty.

For example, adaptive courseware adoption provides the opportunity to make learning more active for students. Rather than content delivery through a lecture during class time, content can be delivered by the courseware so that class time can be repurposed for active learning. For instructors, the use of data provided by adaptive courseware allows for modification of instruction and course activities to meet the needs of students in every course meeting—not only after midterm exams or a week of busy office hours. To do this, instructors must be equipped to monitor the data and analytics provided by the courseware, understand what the data is telling them about student performance and needs, and adapt instruction accordingly. This is a shift for many faculty, and it requires training and practice.

IMPLEMENTING ADAPTIVE COURSEWARE AT YOUR INSTITUTION: THE SIX PHASES

The process of implementing adaptive courseware varied among the eight partner institutions, and even within institutions that were conducting multiple implementations. However, from all the implementation experiences shared by the partner institutions, six clear phases of implementation emerged. The phases are organized into three broader stages: Plan, Build, and Use:

ADAPTIVE COURSEWARE IMPLEMENTATION PATH

PLAN
PHASE 1: ESTABLISH SUPPORT
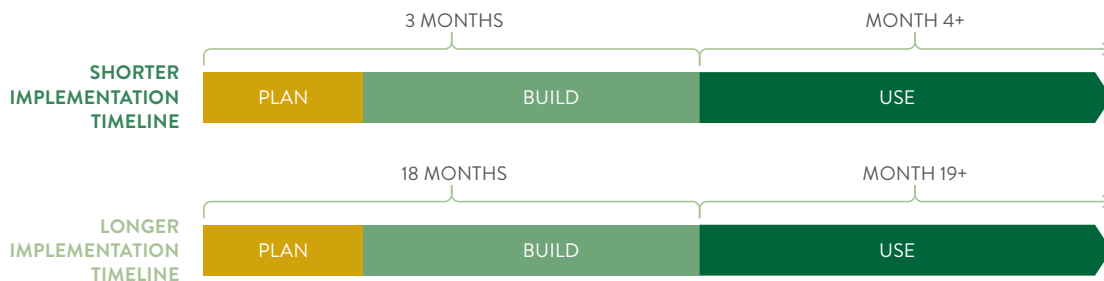**PHASE 2:** DISCOVER AND DECIDE

BUILD
PHASE 3: DESIGN
PHASE 4: DEVELOP

USE
PHASE 5: PILOT AND ITERATE
PHASE 6: SCALE

It is possible your institution may not move through the phases in a linear fashion. For example, you may need to move back to a previous phase, complete activities in multiple phases at once, or complete activities in a different order than described in this guide. Even if your implementation follows a slightly different path, we believe your institution will still find value in the objectives, activities, and guiding questions outlined in each phase. You will still be able to use this guide as a reference, even if you choose not to use it as a step-by-step manual for implementation.

Also, know that the time needed to complete each phase will vary by institution and depend heavily on whether you are using an off-the-shelf product or building an adaptive course from scratch. However, based on the experiences of our partner institutions, timelines from the start of the project to pilot launch ranged from 3 months to 18 months. After the initial pilot launch in Phase 5, timing will also depend on the number of pilot iterations your institution decides to do. Based on our partner institutions' experiences, pilots lasted one to three terms on average before moving toward scale. The length of a "term" varied based on the institution (e.g., semester, quarter).

	3 MONTHS		MONTH 4+
SHORTER IMPLEMENTATION TIMELINE	PLAN	BUILD	USE

	18 MONTHS		MONTH 19+
LONGER IMPLEMENTATION TIMELINE	PLAN	BUILD	USE

HOW TO NAVIGATE THIS GUIDE

This guide is designed for postsecondary administrators and other leaders who want to implement adaptive courseware at their own institutions. The guide is divided into six sections, one for each phase of implementation. To help leaders effectively navigate each phase, each section provides the following information:

A brief summary of the phase

A list of objectives your institution should achieve by the end of the phase

A key showing how involved different stakeholders are in the phase

Suggested activities that can help you meet the objectives for the phase

Guiding questions to help you work through unique aspects or challenges of the phase

TIPS FOR SUCCESS: ADVICE FROM OUR PARTNER INSTITUTIONS

◯ Stakeholder Engagement

◯ Project Management

◯ Institutional Impacts

◯ Evidence-Based Decision Making

CASE STUDY:

LEARNING FROM COLORADO
STATE UNIVERSITY (CSU)

BACKGROUND

ALIGNING ADAPTIVE COURSEWARE
IMPLEMENTATION WITH BIG-PICTURE GOALS

Tips for Success that provide advice on how to handle issues such as stakeholder engagement, project management, larger institutional impacts, and data analysis

Case studies that illuminate how one of our partner institutions navigated the implementation process

Across the guide, we have also embedded links to external resources that might be useful as you complete different activities or steps of the implementation process. However, before diving into the external resources for a phase, we encourage you to read the implementation guide for that phase in its entirety so you have an understanding of how the external resources fit into the larger process.

FINDING THE RIGHT PEOPLE: THE IMPORTANCE OF YOUR IMPLEMENTATION TEAM

The process of successfully implementing adaptive courseware requires individuals from across institutional units to work collaboratively toward a clearly identified goal. Choosing the right team members and team leadership is essential to the success of your implementation. As you work through the implementation process, your team will almost certainly face resistance and setbacks along the way. Therefore, it is essential to assemble a group of nimble and committed individuals.

In this guide, we refer to several roles that have been important to our partner institutions' implementations. These roles are described on the following page with suggestions for individuals or departments that might fill each one.

As you move from phase to phase, the activity levels for the different roles change in intensity. In each section of this guide, you will see a participant "heat map" showing how active each role is in the phase. The more actively involved roles will be indicated with deeper colors. If the box is white, it means the people serving in that role are not actively involved in the phase, although they may still need to stay informed about progress and timelines.

KEY:

- ▢ HIGH LEVEL OF INVOLVEMENT
- ▢ MODERATE LEVEL OF INVOLVEMENT
- ▢ LOW LEVEL OF INVOLVEMENT
- ▢ NO INVOLVEMENT

| PROJECT LEAD | EXECUTIVE SPONSOR | COURSE LEAD | COURSE INSTRUCTORS | ACADEMIC MANAGEMENT |

| TEACHING & LEARNING SUPPORT | VENDOR | RESEARCH & ANALYTICS | TECHNOLOGY SUPPORT | STUDENT SUPPORT |

ROLE	DESCRIPTION	PEOPLE WHO MIGHT FILL THIS ROLE
Project Lead	An individual or small team charged with leading the implementation from start to finish; all other stakeholders take direction from and coordinate with the Project Lead; responsible for project management activities like leading meetings, planning, documenting, and communicating with stakeholders in every phase	Project Manager, Adaptive Courseware Manager, Program Manager
Executive Sponsor	An individual or group at the highest level who will advocate for the initiative throughout the process	Provost, Vice-Provost, Dean, VP of Student Success
Course Lead	An individual or small team that drives course-level decision making related to the courseware implementation	Faculty Leads, Course Coordinators
Course Instructors	Faculty and instructors who will use the adaptive courseware to teach their courses	Faculty, Instructors
Academic Management	Individuals or groups with decision-making power or authority with respect to resource allocation and course curriculum	Deans, Associate Deans, Course Chairs, Department Chairs
Teaching & Learning Support	Individuals with expertise in instructional design and/or teaching and learning who provide a range of support services related to courseware adoption; may be employed by the institution or the courseware vendor	Instructional Designers, Center for Teaching and Learning
Vendor	Company that delivers adaptive courseware solutions; may also offer services like course development or faculty training	Sales, Account Manager, Project Manager (all vendor employed)
Research & Analytics	Individuals who pull and analyze implementation data	Institutional Research (IR) team, Institutional Effectiveness, Analytics, faculty or graduate students
Technology Support	A team that helps develop the infrastructure needed to use adaptive courseware; helps students with access/installation and troubleshooting	Information Technology (IT), Chief Information Officer, Project Managers
Student Support	Includes functions like student advising, bookstore, financial aid, etc.; can help orient students to the new instructional approach and provide access to the instructional materials	Advising, Helpdesk, Bookstore, Library, Financial Aid

WHO MIGHT HELP WITH TEACHING & LEARNING SUPPORT?

Teaching and learning support experts are found in a wide variety of places at different institutions. For example, teams supporting instructional design and learning innovation at the partner institutions come from groups like EdPlus at ASU, the e-Learning Center at NAU, the Office of Academic Innovation at PSU, and the Delphi Center for Teaching and Learning at UL.

While all the roles are important for a successful implementation, three roles in particular act as the cornerstones of your team. Choosing the right people with the right qualities and skillsets to fill those roles is essential to your overall success. Those three roles are:

- **Project Lead:** This individual or small team guides and coordinates every step of the implementation process. They must have strong project management skills, an expert knowledge of pedagogy, and the capability to draw on existing relationships or build new relationships across the institution. The partner institutions that helped write this guide had instructional designers, program managers, and higher-level administrators serving in this role.

- **Executive Sponsor:** This individual or group must be able to advocate for the adaptive courseware project at the senior level within an institution. The Executive Sponsor should have budgetary authority and access to a wide range of institutional resources. The Executive Sponsor should also be available to play an active role as needed in all phases and to keep an eye on the progress of the initiative.

- **Course Lead:** The individual or small team serving in this role must be able to provide guidance when selecting a courseware solution, help redesign the course(s), participate in the pilot, and support scaling activities (Phases 2–6 generally). The Course Lead should be enthusiastic about the courseware implementation and have good relationships in the department that will pilot the courseware. The Course Lead is often a faculty champion (someone who is willing to try new instructional approaches in the classroom).

PREPARE FOR TURNOVER

Turnover in faculty and institutional leaders happens frequently, and it has the potential to slow or even halt your implementation. To manage the potential effects of turnover, consider whether key project roles should be held by a small group of people rather than one individual. Also, remember to clearly and comprehensively document your processes in case you need to bring new team members on board.

IMPLEMENTATION: TIPS FOR SUCCESS

As our partner institutions collaborated and shared their experiences, we compiled advice and best practices based on their successes and struggles. Four key categories of advice for implementation success emerged:

- **Stakeholder Engagement:** Develop strategies to keep stakeholders engaged and excited in every phase by communicating effectively and managing expectations.

- **Project Management:** Develop approaches and tools to manage different aspects of the project (e.g., a project plan, timelines, budget tracking).

- **Institutional Impacts:** Think through how your implementation will affect other groups on campus, how it will impact shared resources, and how it aligns with existing policies and norms.

- **Evidence-Based Decision Making:** Collect and use data to inform decisions in all phases, from planning through scaling the implementation.

STAKEHOLDER ENGAGEMENT

PROJECT MANAGEMENT

INSTITUTIONAL IMPACTS

EVIDENCE-BASED DECISION MAKING

In every section of the guide, we provide specific Tips for Success. These tips are meant to help the Project Lead anticipate challenges and successfully navigate each phase of implementation.

STUDENTS ARE YOUR MOST IMPORTANT STAKEHOLDERS

Students are your most important stakeholders in the implementation process and should be considered at every step. They should be engaged at critical points during the process to ensure the new instructional approaches and new adaptive courses developed by your institution meet their needs.

PHASE 1: ESTABLISH SUPPORT

WHAT HAPPENS DURING PHASE 1?

During Phase 1 (Establish Support), your institution should start building foundational plans for the implementation. You should identify your rationale and big goals for the project, understand what resources will need to be allocated to supporting the implementation, and start building support of institutional stakeholders. You should leave Phase 1 confident that key stakeholders are willing to commit time and energy to the subsequent steps of the implementation process.

OBJECTIVES: WHAT SHOULD YOUR INSTITUTION ACCOMPLISH?

By the end of Phase 1, your institution should be able to:

1. Articulate the rationale for using adaptive courseware at your institution and the problem(s) it seeks to solve.

2. Describe what a scaled implementation would look like.

3. Complete a high-level implementation plan that includes consideration for team, budget, timeline, and resource requirements.

WHO IS INVOLVED IN PHASE 1?

PROJECT LEAD	EXECUTIVE SPONSOR	COURSE LEAD	COURSE INSTRUCTORS	ACADEMIC MANAGEMENT

TEACHING & LEARNING SUPPORT	VENDOR	RESEARCH & ANALYTICS	TECHNOLOGY SUPPORT	STUDENT SUPPORT

BEGIN WITH THE END IN MIND

From the beginning, build excitement around the idea of what is possible when adaptive courseware is used at scale. Although your institution will try the adaptive courseware on a smaller scale and adjust before expanding, it is important to keep your sights set on the end goal of reaching scale. (Note that the partner institutions defined "scale" as using the adaptive courseware in all sections of the targeted course(s).)

SUGGESTED ACTIVITIES

To help your institution navigate Phase 1, we developed this Adaptive Courseware Early Implementation Plan Worksheet to help your institution document preliminary plans. Based on the experiences of our partner institutions, you may find the following activities helpful.

- **Establish the rationale for your adaptive courseware implementation.** Articulate why your institution is considering using adaptive courseware. This may require discussions with Academic Management from across the institution to help identify challenges or needs that can be addressed with adaptive courseware. Keep in mind that your initiative is more likely to be supported by stakeholders from across the institution if you can demonstrate that it aligns with broader institutional goals.

- **Identify your Project Lead.** The Project Lead serves as the leader and organizer for the entire implementation process. It is essential that the Project Lead have good relationships (or the ability to build relationships) with instructors and administrators in the departments affected by the implementation. (See pages 5–6 for a detailed description of the Project Lead's role and responsibilities.)

- **Identify an Executive Sponsor to champion the initiative.** (See pages 5–6 for a detailed description of the Executive Sponsor's role and responsibilities.) It is essential to secure the support of top-level leadership during the initial phase of your initiative. The Executive Sponsor should have the capability and willingness to:

  - Secure the appropriate human resources for the implementation.

  - Advocate for and allocate financial resources.

  - Meet with groups on campus to communicate expectations around participation, timelines, and resource requirements.

- **Reflect on your institutional culture and attitude toward innovation and continuous learning.** Because using adaptive courseware involves a change in pedagogy, instructors will likely need to step outside their comfort zone in order to redesign courses and integrate adaptive courseware. If your institution's culture is not perceived as providing an environment to explore new academic approaches and learn from mistakes, instructors may be hesitant to participate. Begin thinking about what kind of structures can be put in place to encourage instructors to try new approaches.

GUIDING QUESTIONS

- What incentives already exist that encourage instructors to change their approach to teaching?

- What might discourage them from changing their practice?

- Is your Executive Sponsor able to create new incentives or change policies that present hurdles?

- **Map the resources required from across the institution to support implementation.** Successful implementations of adaptive courseware require support and participation from a wide range of departments and staff across the institution. Using the participant "heat map" outlined in each phase as a starting point, create a map of the different groups at your institution whose services, time, or resources will be required. This will help you identify potential gaps in resources and staff. Your Project Lead and/or Executive Sponsor should then communicate with the different groups to gauge their current capacities and determine if additional resources or new hires are required. (See page 5 for a detailed description of all the stakeholders involved in the implementation process and their general roles and responsibilities.)

> **NOTE:** Although you will develop high-level plans for your implementation during this phase, do not assume they are complete or final. As you move through the phases, you will likely need to adjust some elements of your plan. If you find that you need to make significant changes, make sure you return to the objectives of Phase 1 to establish support for the new plan.

TIPS FOR SUCCESS: ADVICE FROM OUR PARTNER INSTITUTIONS

Stakeholder Engagement

- Consider how and when you will announce the initiative to the larger community, including which person or department is best suited to build buy-in as the public face of the initiative. Make sure you demonstrate how the initiative fits within the institution's larger strategic plans and show that the initiative has leadership support.

- When asking departments or unit heads to share information about the initiative with their staff, make sure that messaging is consistent by providing talking points and documentation.

- Consider sending "invitations to participate" to stakeholders. Invitations, as opposed to mandates, provide an opportunity to obtain project buy-in by finding willing participants who will self-select into the initiative. At this early stage, start exploring whether your institution can offer incentives for participation.

Project Management

- Transformational initiatives require project and business planning. Ensure your institution has both the personnel and the tools for effective project management starting in Phase 1 because it will become more complex in future phases.

- Consider whether your institution will use a memorandum of understanding (MOU) or other agreement to document goals, resources, roles/responsibilities, and timelines. (Not all institutions use such documentation, but there seems to be a growing acceptance that planning and responsibility documentation are very helpful for keeping initiatives on track.)

Institutional Impacts

- Support among all high-level administrators (e.g., Chief Academic Officer, Provost, Chief Information Technology Officer, Student Affairs) is paramount to the long-term success of your effort, especially as you move toward scale. It is particularly important to have wide-ranging support so that the initiative can withstand changing institutional priorities and leadership.

- If your implementation requires the use of shared resources (e.g., Teaching and Learning Center staff, administrative staff, technology support, instructional designers), figure out the availability and constraints of those resources early in the process.

Evidence-Based Decision Making

- Get your Research & Analytics team involved early in the implementation to ensure your team will have access to relevant institutional data to support your project.

- Find and document data to support your goals and rationales in Phase 1, including other institutional experiences or from research. Doing so can also help convince key stakeholders to support the initiative.

CASE STUDY

LEARNING FROM COLORADO STATE UNIVERSITY (CSU)

BACKGROUND

In 2011, the president of CSU announced that the campus should raise its six-year graduation rate to 80% from the recent historic high of 66.8%. This goal—along with others such as eliminating equity gaps in student graduation rates—is now part of the CSU Student Success Initiative (SSI). SSI is now in its second phase (SSI 2), and includes a range of projects aimed at improving student learning experiences and outcomes.

ALIGNING ADAPTIVE COURSEWARE IMPLEMENTATION WITH BIG-PICTURE GOALS

When the APLU adaptive courseware grant program was announced, implementation champions at CSU seized the opportunity to align the adaptive courseware initiative with the broader student success goals of the institution. SSI 2 includes an emphasis on data-informed initiatives that help improve student engagement and learning. The adaptive courseware project presented a strong fit with that strategy and had the potential to help the university meet its goals for year 2020.

Aligning the adaptive courseware project to SSI 2 helped to build support for the initiative across all levels of the institution—including leaders and faculty. It also put the implementation in a good position to access resources such as the institution's instructional design and development team to run the project. By connecting their adaptive courseware implementation with broader institutional goals, the CSU implementation team was able to form a strong foundation early in the project.

To learn more about SSI 2, check out the article on CSU's Student Success Initiative.

PHASE 2: DISCOVER AND DECIDE

WHAT HAPPENS DURING PHASE 2?

During Phase 2 (Discover and Decide), your institution engages in an extensive exploration. You evaluate both existing internal resources and potential external resources that could be useful for an adaptive courseware implementation. During this phase, you look back at the implementation goals/rationale that you identified in Phase 1 and find specific solutions to address them. At the end of the phase, you select an adaptive courseware product and decide which courses will implement your chosen solution during a pilot.

INTERNAL

- Opportunities
- Lessons Learned
- Relationships
- Capabilities
- Requirements

EXTERNAL

- Peer Activities
- Impacts
- Lessons Learned
- Capabilities
- Requirements
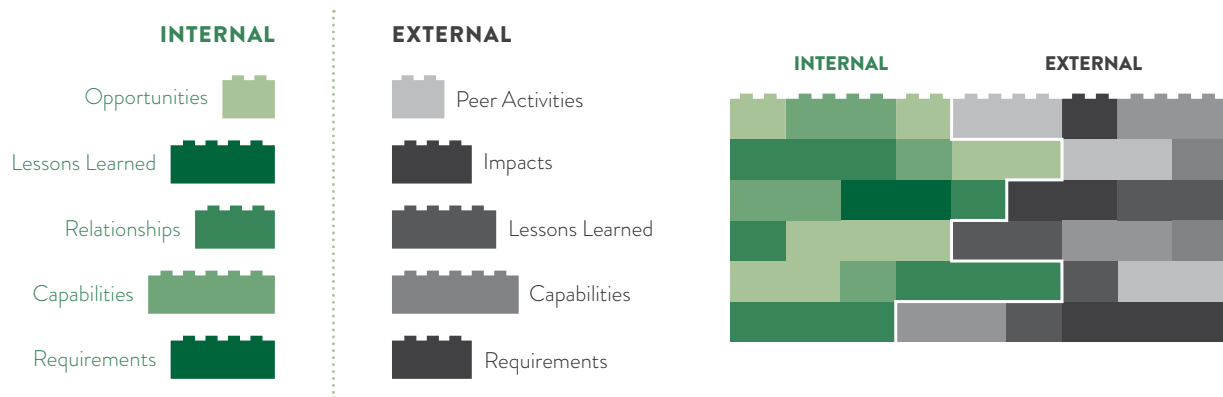
INTERNAL **EXTERNAL**

OBJECTIVES: WHAT SHOULD YOUR INSTITUTION ACCOMPLISH?

By the end of Phase 2, your institution should be able to:

1. Describe the internal context for your implementation: your stakeholders' capabilities and needs, and any institutional dynamics that could impact your implementation.
2. Describe the external landscape for adaptive courseware adoption, including products available and best practices for application.
3. Identify the target course(s) for courseware implementation in the pilot and choose a courseware product(s) that is best suited to meet the needs and goals of the institution.

WHO IS INVOLVED IN PHASE 2?

PROJECT LEAD	EXECUTIVE SPONSOR	COURSE LEAD	COURSE INSTRUCTORS	ACADEMIC MANAGEMENT
TEACHING & LEARNING SUPPORT	VENDOR	RESEARCH & ANALYTICS	TECHNOLOGY SUPPORT	STUDENT SUPPORT

NOTE: The activities in Phase 2 help you understand the context for your implementation at a single point in time. As internal and external environments evolve over time (e.g., changes in institutional leadership and priorities, new products entering the market), you may have to revisit some of the Phase 2 activities. Furthermore, new questions will arise and additional information will come to light as you work through implementation. Successful implementation requires a willingness to reevaluate and revise plans in response to changes.

SUGGESTED ACTIVITIES

Based on the experiences of our partner institutions, you may find these activities helpful. We have also created a [Phase 2 Discovery Worksheet](#) to help your Project Lead navigate this phase and document key information.

Explore Your Internal Context

- **Conduct interviews with key stakeholders** (e.g., instructors, Academic Management, Teaching & Learning Support team members, and Technology Support team members) to learn about their instructional and technological needs and concerns and uncover important institutional dynamics. These interviews should start to reveal stakeholders' familiarity with adaptive courseware, openness to trying new technologies and instructional approaches, and readiness to implement adaptive courseware.

- **Work with your Research & Analytics team to get course-level data.** Review performance metrics to help determine which courses may be good candidates for an adaptive courseware implementation. The evidence-based review might include an analysis of potential courses based on student success metrics such as low average grades, low pass rates (final grades of C or better), high DFW rates (percentage of students receiving D or F grades, or who withdraw from the course), or achievement gaps between different student populations.

- **Work with instructors and administrators to understand current course practices and materials.** Explore how an adaptive courseware solution would fit into or replace the existing structures of the target courses. It is important to work collaboratively with instructors and department heads to understand their existing resources and how they use them. For example, you may find that their textbook has a digital courseware companion or replacement product that is relatively easy to adopt.

GUIDING QUESTIONS

- What challenges do instructors and students face that adaptive courseware might help solve?
- What lessons have others at your institution learned from past instructional innovation initiatives?
- How would adaptive courseware change the existing structure of the target course (e.g., lecture, lab time, discussion sections)?

Explore the External Context

- **Explore products and vendors.** Understand the landscape of adaptive courseware solutions available and the tradeoffs of each. Evaluate the current range of digital learning solutions for the courses/subject areas you have identified using consistent criteria. Our partner institutions have found these activities and resources to be helpful:

  - Reviewing products using the Courseware in Context (CWiC) Framework or EdSurge Product Index.

  - Sending out requests for information (RFIs) to vendors to learn about product specifications and functionalities. For a link to an example vendor RFI, see the Appendix.

  - Asking for product demonstrations or trial accounts.

- **Network with others who have experience using adaptive courseware.** Find other institutions that have implemented adaptive courseware. Learn from their experiences (e.g., which products they used, how they evaluated their success, whether they achieved their goals). One helpful resource for virtual networking with higher education leaders is EdSurge Loop. Your leadership team may also want to attend relevant conferences and networking events with the goal of building a network of innovative, supportive educators who can swap ideas and offer support.

- **Look at the research.** Explore recent research or case studies that document the impacts of teaching and learning innovations, like adaptive courseware, to help build your understanding of how these initiatives might have an impact at your institution. Resources like the CWiC Research Collection can help.

> **? GUIDING QUESTIONS**
> - Will the products work with your existing infrastructure and institution policies (e.g., accessibility, data security)?
> - What kind of training and technical support do vendors offer?
> - Does a product give you access to the kinds of data you need to evaluate if the initiative is a success?
> - Is the vendor able to support your implementation at scale?
> - What academic interventions are making a difference at other institutions?

Make Decisions

- **Choose your target course(s), participating course instructors, and a Course Lead.** At the end of this phase, your team should agree on which course(s) and instructors will implement adaptive courseware during the pilot phase, and who will act as the Course Lead. (For a detail description of the Course Lead's role, see page 6.) Use what you learned during Phases 1 and 2 about where opportunities, champions, and strong relationships exist in your institution to guide your decision. It is advantageous to partner with instructors who are open to new teaching methods and excited about the adaptive courseware initiative. When choosing target courses and instructors, attitudes can be just as important as course data. Keep in mind that a good pilot is limited in scope. We recommend using adaptive courseware in a few sections of a course during the pilot, and allowing other sections to be conducted normally as a control group.

- **Select a courseware solution that meets the needs of instructors.** Work with course instructors to find a solution that meets their needs for product functionality and content. Also, consider your stakeholders' capacity and interest in taking on a significant course redesign or development project. Remember, the pilot Course Lead and course instructors may be more concerned with the content than the specifics of the technology. Consider narrowing down the list of vendors based on disciplines offered and technology specifications before asking them to review.

To Build or Not to Build?

As you begin analyzing different options for your adaptive course, be aware of issues and challenges that arise when creating a course from scratch.

Many of our partner institutions have found that vendors already offer an adaptive courseware component or a textbook replacement product for a given course, and using these products is often easier than building a customized course. The institutions have also found that these solutions often meet most of their needs, especially if course instructors are not familiar with adaptive courseware or the institutions do not have instructional design resources available.

On the other hand, several institutions have found that despite the significant effort required to build a course from scratch, this customization leads to more engaged stakeholders, particularly course instructors.

If you decide to custom-build a course, your institution should be prepared for what the process entails and have plans in place if the course is not ready by the anticipated start date. It can take several semesters to build and test a new adaptive course. It will involve a partnership among instructional designers, subject-matter experts, vendors, and IT/technical professionals. In comparison to printed curricula or static courses, adaptive courses require a much larger body of content and assessments so that each student can have a customized, adapted pathway through the material. Institutions may also run into intellectual property issues as they develop and curate content.

Use what you have learned about your internal and external context to decide what level of course customization you can pursue.

OFF-THE-SHELF COURSE　　**CUSTOMIZE EXISTING COURSE**　　**FULL COURSE BUILD**
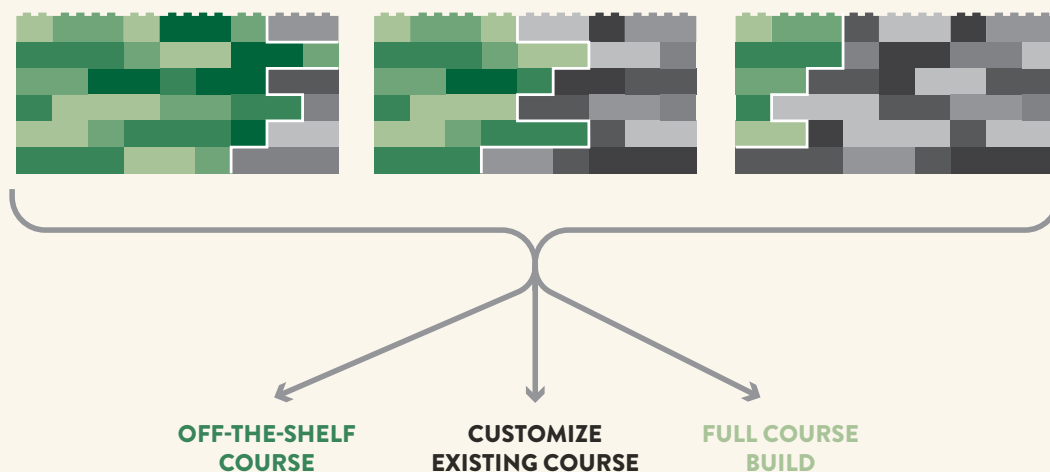
TIPS FOR SUCCESS: ADVICE FROM OUR PARTNER INSTITUTIONS

Stakeholder Engagement

- Assessing qualitative factors like attitude toward change and support of department leadership is difficult, but essential. Use your relationships with your Academic Management or the Course Lead to collect this data.

- Ask institutional or departmental leaders to cohost events during this phase to raise awareness and generate interest in the project.

Project Management

- Discovery can seem to be an endless process. It may be helpful to set expectations for the scope and duration of your discovery process early—and to set expectations for how much information is enough to make decisions and move forward.

- Document the information you gather in a way that will allow you to share it with implementation decision-makers and interested stakeholders who are impacted by the decisions made in this phase.

Institutional Impacts

- Explore the institutional resources available to support your implementation. For example: Does your institution have capacity for a full course redesign, or will you need to buy an off-the-shelf product? If you do want to design or redesign a course, will you contract with a service provider, or do you have the capacity to create a course using your existing staff?

- Identify which stakeholders at your institution make decisions about textbooks, course design, accreditation, scheduling, student fees, platform purchasing, etc. Think about how they need to be involved in these early phases so that they are prepared for and supportive of the initiative later in the process.

Evidence-Based Decision Making

- Work with Research & Analytics early and see what data are already available to inform your pilot decisions. See what systems are already in place to track the progress and success of your initiative.

- The published evidence of efficacy for any given courseware product is limited. Therefore, this kind of data should not be the sole criteria used for selecting your courseware. While it might be helpful to review other institutions' published outcomes, your decision-making process should focus on selecting courseware that meets the specific needs of your institution and stakeholders.

- Advice from peers who have used courseware products may be a great source of information. However, keep in mind that the outcomes achieved by using a product in one context will not necessarily be replicable in another context.

CASE STUDY

LEARNING FROM GEORGIA STATE UNIVERSITY (GSU)

BACKGROUND

During the 2016–2017 academic year, a team of faculty and staff from the Center for Excellence in Teaching & Learning (CETL) at GSU were tasked with evaluating and selecting adaptive courseware solutions for five gateway undergraduate courses in Economics, Political Science, and Psychology.

EXPLORING EXTERNAL RESOURCES: HOW GEORGIA STATE EVALUATED POTENTIAL VENDORS

In order to effectively conduct a comprehensive review of adaptive courseware products, the team started with a list of preapproved vendors. It was then necessary to develop a high-quality evaluation tool that could be used to consistently evaluate products. Working collaboratively with technical staff and instructional designers, the group chose to modify an existing evaluation tool, the CWiC Framework Product Taxonomy.

To understand the needs of faculty, CETL staff used the CWiC Product Taxonomy as a base for conversations about product features. Then, after tailoring the CWiC to the unique needs of the institution's faculty and students, the evaluation tool was distributed to 21 vendors in the form of a Request for Information (RFI).

Upon receiving 15 vendor responses, faculty-led teams reviewed the information and selected their top choices. Seven vendors were then invited to visit GSU for a Courseware Vendor Fair. The two-day event included back-to-back product demonstrations and one-on-one meetings for vendors to talk to faculty who had previously explored demo accounts.

KEEPING FACULTY ON THE FRONT LINES DURING THE VENDOR EVALUATION PROCESS

Following the Courseware Vendor Fair, final courseware selections were made by the faculty coordinators who were responsible for leading the implementation of adaptive courseware in their respective departments. Faculty from the five courses selected four different courseware products for the pilot. Keeping faculty involved throughout the vendor evaluation process increased early buy-in and ensured that the products selected met the needs of those who used them.

For more information about GSU's implementation process, look for an article in press "Adaptable Selectivity: A Case Study in Evaluating and Selecting Adaptive Learning Coursewares at Georgia State University" in *Current Issues in Emerging eLearning*.

CASE STUDY

LEARNING FROM THE UNIVERSITY OF LOUISVILLE (UL)

BACKGROUND

The adaptive courseware initiative at UL aims to improve rates of student success in foundational courses by reducing the DFW rates. In order to identify courses with the greatest potential for impact using adaptive courseware, the implementation team used a combination of quantitative and qualitative data.

EXPLORING THEIR INTERNAL CONTEXT: HOW UL IDENTIFIED TARGET COURSES

To get started, the implementation team asked its IR team to provide the DFW rates for the previous six semesters in courses that gave credit for a student's core curriculum. Courses that had a DFW rate of 18% or higher were identified as potential target courses. From that course list, the implementation team then narrowed its potential pilot course list further.

First, the team compiled a list of faculty members who already had experience with instructional technology. To accomplish this, they asked their learning management system administrators, technical support staff, teaching and learning center consultants, and vendor salespeople to provide a list of faculty who were using one of their identified adaptive courseware products or similar kinds of classroom technology. The team then generated a list of faculty who regularly participated in programming at the Delphi Center for Teaching and Learning at UL, which indicated to them an interest in innovation.

By cross-referencing these lists, the implementation team was able to identify faculty who already had experience with technology and regularly participated in teaching innovation projects. The target courses taught by these interested and experienced faculty members moved to the top of the target-course list. The implementation team also considered whether any of the target courses were in the same department, and if so, prioritized those courses with the hope of building wider departmental support for their pilot.

SELECTING THE RIGHT PARTNERS FROM THE START

By combining quantitative data from the IR team and faculty lists from technology partners and the Delphi Center for Teaching and Learning, the implementation team at UL was able to identify courses and faculty for the pilot who were best positioned for success. The team at UL believes that this thoughtful selection not only impacted the pilot, but will also impact the scaling phase when the early faculty experiences become crucial to building broader buy-in.

PHASE 3: DESIGN

During Phase 3 (Design), your implementation team designs the adaptive courseware pilot. Taking into account your goals and decisions outlined in Phase 2, your team designs the pilot course(s) by creating a blueprint that can be used to actually build the course in Phase 4. Your team also decides how the pilot will be evaluated and solidifies agreements with stakeholders who will take part in the pilot. It is also suggested that you create a more detailed pilot plan, which will help keep the project on track during Phases 4 and 5.
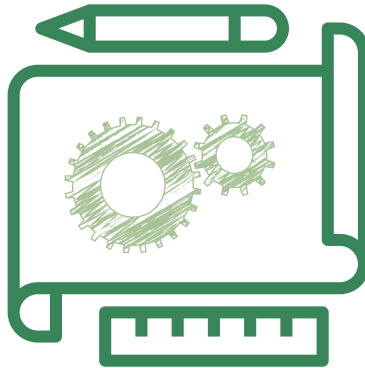
OBJECTIVES: WHAT SHOULD YOUR INSTITUTION ACCOMPLISH?

By the end of Phase 3, your institution should be able to:

1. Describe how your chosen adaptive courseware product will be used in pilot course(s).
2. List measurable metrics that you can use to track progress toward implementation goals.
3. Document your agreements with participants and vendors.

WHO IS INVOLVED IN PHASE 3?

PROJECT LEAD	EXECUTIVE SPONSOR	COURSE LEAD	COURSE INSTRUCTORS	ACADEMIC MANAGEMENT
TEACHING & LEARNING SUPPORT	VENDOR	RESEARCH & ANALYTICS	TECHNOLOGY SUPPORT	STUDENT SUPPORT

NOTE: As you begin to design your pilot, stakeholders' availability and interest in different aspects of course design may shift. If this happens, you may need to revisit some aspects of the previous phases and make adjustments before investing resources in the actual design of a pilot.

SUGGESTED ACTIVITIES

Based on the experiences of our partner institutions, you may find these activities helpful:

- **Document key design elements of the course(s) that will use adaptive courseware.** What it takes to design or redesign a course will vary significantly depending on the product and vendor you choose. During the Design phase, you should collaborate with your Course Lead, course instructors, and instructional designers to consider how the pedagogy of each course should change with the implementation of adaptive courseware. If your institution uses any course design templates, the end product of your work may be a completed course template or blueprint that will guide course development in Phase 4.

GUIDING QUESTIONS

- What instructional purpose(s) do you envision the courseware having?

  Consider:
  - A homework/quizzing system.
  - Exam preparation tools.
  - An extra help/self-remediation component.
  - A textbook replacement.
  - A system for student collaboration on activities.
  - Resources that the instructor can access and use during class.

- How will each chosen functionality impact how the course is taught?

- **Solidify incentives for participation in the pilot.** Depending on your institutional context, you may need to offer incentives to motivate course instructors to participate. Incentives are most often financial, time, or recognition based, and vary in terms of amount. Consider the perceived importance of the initiative, the existence of other incentives, and the terms of existing contracts with faculty or instructors.

CREATING INCENTIVES

Course Leads and course instructors who participate in the pilot will invest additional time and energy beyond their normal load. This can discourage participation. Ways that institutions can encourage participation include:

- Financial incentives like stipends. Course Lead incentives ranged from $500 to $7,500 at partner institutions.

- Time off or reduced instructional load to devote time to the new course development or instruction.

- Support for professional development through conference attendance.

- Support for research on pedagogy or outcomes using adaptive courseware.

- Publication opportunities.

- Recognition for participation through internal or external awards.

- **Decide how the pilot will be evaluated.** Pilot evaluation metrics should be identified based on the broader implementation goals, data availability from your Research & Analytics team, and how the courseware is being integrated into the pilot. If you learned about other institutions that implemented courseware in similar courses or with similar populations of students, gather information from those implementations to inform your pilot evaluation metrics.

- **Negotiate agreements with vendors and pilot participants.** Agreements with vendors will be formal subscription and service agreements and should include a term for the contract, details of the product offering and update process, and specific services offered to support implementation, training, and ongoing use. Your Technology Support team should confirm that the courseware meets all institutional technology requirements before finalizing a contract. Agreements with pilot participants may be nonbinding MOU's that stipulate the expected time and effort contribution of the participant, any incentives for participation, and a term. (An example MOU for participants is provided in the Appendix, page 42.)

- **Create a pilot plan.** As the courseware implementation project moves from planning to execution, more people and institutional resources will be involved. As you determine key elements of the pilot during the Design phase, create a detailed pilot plan that can be shared with stakeholders during implementation to communicate deadlines, milestones, and dependencies. The Project Lead may seek support from an in-house project manager when developing the pilot plan. However, if a project manager is not available, there is a strong likelihood that other staff—instructional designers, IT analysts, or business analysts—will have the skills to help the Project Lead set up a pilot plan. (For an example of a detailed task list that was used to design a new course, see the Appendix, page 42.)

TIPS FOR SUCCESS: ADVICE FROM OUR PARTNER INSTITUTIONS

Stakeholder Engagement

- In order to ensure students use the new courseware, their performance on the courseware must count for some percentage of their overall course grade. Partner institutions weighted the courseware use between 10% and 40% of students' total grade. Decisions about how the courseware will be weighted might be made by the Course Lead or course instructors depending on the institution.

- It is important to consider the cost of the selected courseware to the end user— the student. Think about whether the courseware will increase or decrease the costs relative to nonadaptive sections.

Project Management

- It can save time if you leverage an existing course design template or create a course structure that is already familiar to the Course Lead, course instructors, the Teaching & Learning Support team, and the Technology Support team.

- Find the right balance of comprehensiveness in your design and timeliness to meet your project timeline. Remind course designers that additional work to refine the design can be completed in the Develop phase if you risk falling behind schedule and losing access to important development resources or funding.

Institutional Impacts

- If your course instructors are new to teaching with adaptive courseware, expertise and guidance from your Teaching & Learning Support team members will be crucial during this phase.

- Start thinking through the impacts of the implementation outside of the classroom. Consider whether there are curricular changes that will need approval, or whether policies regarding financial aid, faculty contracts, accessibility standards, data governance, or other topics will need to change with the implementation.

Evidence-Based Decision Making

- The Course Lead and course instructors designing the course should consider how consistent the use of courseware must be from classroom to classroom. Allowing different instructors to use the courseware in different ways may impact the pilot evaluation data.

- When designing your course(s), look for instructional best practices that have evidence of impact or that are built on a base of research. Examples include:
  - Resources on Active Learning, University of Michigan
  - Center for Educational Innovation, Active Learning, University of Minnesota

- Your institutional experiences are also part of the evidence base for what works. Look back at the information that you collected in Phase 2 (Discover and Decide) to see if there are instructional or change management approaches that have worked well with your faculty and students.

CASE STUDY

LEARNING FROM THE UNIVERSITY OF MISSISSIPPI (UM)

BACKGROUND

UM's *First Year Writing I* pilot included 20 instructors teaching 61 sections in 2017. The instructors adopted Lumen Learning's Waymaker courseware solution for the pilot.

THE IMPORTANCE OF SETTING CLEAR EXPECTATIONS

Multisection pilots can present challenges for evaluation and improvement if clear expectations for use of the courseware are not established during pilot design. This was the case at UM. In UM's *First Year Writing I* pilot, the Course Leads gave the 20 participating instructors flexibility in how to use the adaptive courseware modules. They also gave them flexibility to determine how much the courseware performance would contribute to their students' final grades.

Consequently, the course instructors' instructional approaches and grading expectations varied widely. Some instructors fully integrated all eight learning modules into homework practice and in-class activities, while other instructors encouraged students to use the modules on their own to practice course concepts. In terms of grading, the Course Leads suggested that the courseware account for 10–20% of the final grade. While instructors stayed within that range, one quarter counted the courseware as 10% of the final grade, half of the instructors set it at 15%, and the remaining quarter set it at 20%.

FLEXIBILITY CAME AT THE EXPENSE OF MEASUREMENT

While giving instructors flexibility to use courseware in their sections in different ways may have invested them in the implementation process, it came at the cost of pilot consistency and evaluation. The variations in use and grading made comparison of pilot course outcomes against control group outcomes very difficult.

Despite the difficulty this presented for assessment, the Course Leads met and decided to continue to allow instructor flexibility in how the modules were used rather than changing practices for the sake of gaining comparative data. However, this experience has informed the design of other pilots at UM. The Course Lead and Project Lead now consider the degree to which the use of courseware should be consistent across sections when designing a pilot and training instructors.

PHASE 4: DEVELOP

WHAT HAPPENS DURING PHASE 4?

During Phase 4 (Develop), your institution will develop the pilot course(s) using the courseware you selected. (Depending on what you have chosen, this may mean integrating an off-the-shelf product into a course, modifying an adaptive courseware product, or building an adaptive course from scratch.) This phase should also include the development of the critical ecosystem supports and resources needed for a successful pilot (e.g., evaluation and measurement plans, instructor training sessions, technology support, student support resources). It is also crucial in Phase 4 to help course instructors participating in the pilot understand how their pedagogy will change with the use of adaptive courseware. By the end of this phase, all stakeholders—instructors, administrators, support staff, and vendors—should be prepared to launch the pilot.

OBJECTIVES: WHAT SHOULD YOUR INSTITUTION ACCOMPLISH?

By the end of Phase 4, your institution should be able to:

1. Create a pilot course that integrates adaptive courseware. This may mean purchasing and setting up an off-the-shelf product, modifying a product, or building a customized course from scratch.
2. Test courseware to ensure it functions as expected.
3. Demonstrate that appropriate institutional resources are in place to support an effective pilot.

WHO IS INVOLVED IN PHASE 4?

PROJECT LEAD	EXECUTIVE SPONSOR	COURSE LEAD	COURSE INSTRUCTORS	ACADEMIC MANAGEMENT

TEACHING & LEARNING SUPPORT	VENDOR	RESEARCH & ANALYTICS	TECHNOLOGY SUPPORT	STUDENT SUPPORT

> ⚠ **NOTE:** As you begin to build out a course and develop the supporting resources, you will likely begin to see what is feasible in terms of functionality, budget, and timeline. Do not hesitate to return to Phase 3 if you find that your plans are not realistic.

SUGGESTED ACTIVITIES

In this phase, there are four categories of development happening simultaneously. The Project Lead must ensure that all four areas of development are completed successfully. To stay on track, the Project Lead should track the many dependencies among the four areas, and know that changes in one area will likely ripple into another.

AREAS OF DEVELOPMENT

COURSE PLATFORM AND CONTENT	EVALUATION	USER SUPPORT	INTEGRATION AND ACCESS
Develop or modify the course content with the help of the Course Lead, course instructors, the Teaching & Learning Support team, and/or vendor. (If you are using an off-the-shelf product, this may be minimal.) If you modify or customize an existing product, consult with the vendor or an in-house expert to ensure that the courseware performs as expected after changes are made. Conduct extensive quality control testing to ensure all aspects of the courseware are functioning as expected: student interface, instructor interface, and data collection/reporting tools.	Develop a measurement and evaluation plan for tracking progress toward implementation goals and measuring pilot success. Include quantitative and qualitative data on the pilot impacts. This research design resource may help. Confirm that the vendor can provide necessary data and that it is presented in a format that meets your needs. If not, work with the vendor, Technology Support and your Research & Analytics team to develop the needed reports. Determine if Institutional Review Board (IRB) approval is required (generally a concern if you are planning to publish research).	Create an instructor training program that shows them how to access courseware, leverage data to make instructional decisions, and manage administrative controls. Share expectations for how course instructors will implement the courseware so that the pilot produces useful data. If multiple instructors are participating in the pilot, be clear about the level of consistency required in their use of the adaptive courseware. Create a student training program that shows students how to install/access courseware, use the courseware, and get access to help/support.	Integrate the courseware within the current learning technology infrastructure. Allow sufficient time for course corrections/ troubleshooting as challenges always arise. Create a courseware distribution plan with the bookstore and vendor. The plan should include sales channels, bundling, term of subscription/purchase, pricing for students, and payment options. Develop a plan to communicate important technical elements with stakeholders affected by the implementation.

> **NOTE:** If your institution chooses to use an off-the-shelf courseware product, resources for user support and technical documentation may already be available. Before developing something new, see if there is already an existing resource or template that can be used as a starting point.

TIPS FOR SUCCESS: ADVICE FROM OUR PARTNER INSTITUTIONS

Stakeholder Engagement

- If the Course Lead or course instructors are leading development, lighten their instructional load during the development period if possible or offer financial or recognition incentives appropriate for the additional effort.

- Consider how to make students aware of course design through onboarding activities and by sharing the anticipated changes to the course(s) and the rationale for the changes. Provide a mechanism for student feedback during the course, not just at the end of the course.

Project Management

- Strong project management is key to managing parallel and dependent workstreams. The Project Lead will need to be prepared to handle shifts as development processes frequently change.

- Consider creating and distributing a week-by-week master project plan for the Develop phase. Ask whether your institution uses any project management approaches, and if not, explore on your own to see if an existing approach is well suited to meet your needs.

Institutional Impacts

- Leverage the expertise of the Teaching & Learning Support team and the Technology Support team. If these support resources are managed centrally, ensure they have the time and availability to keep development on track.

- Engage different groups within Student Support to ensure their readiness to respond to student questions about course options, access, financial aid and more.

Evidence-Based Decision Making

- Continue to refer to evidence-based principles for course design and development. Refer back to Phase 3 (Design) for a list of resources.

CASE STUDY

LEARNING FROM APLU UNIVERSITIES

BACKGROUND

In 2015, the Personalized Learning Consortium (PLC) at APLU launched the English Composition Adaptive Courseware Development project. The goal was to educate faculty about recent innovations in adaptive learning technologies and support cross-institution faculty collaboration. Fourteen faculty from four institutions participated in the project. Participating institutions were Georgia State University, Montclair State University, the University of Georgia, and the University of Mississippi.

COLLABORATION OFFERED BENEFITS AND LESSONS

Faculty working on the development project met face-to-face and virtually to collaborate on courseware selection, design, and development. After piloting the courseware, they then shared their experiences. Beyond the expected benefits of learning from other collaborators, the participants were surprised by unexpected benefits and lessons learned, including:

- **It is important to understand a vendor's product capabilities today as opposed to in a future state.** The collaborators on this project sent a request for information to vendors and received eight responses. From those, they selected four for advanced review. None of the products reviewed met all of the needs of the collaborators, though vendors offered to develop new product functionality to meet the needs of the project. However, the vendor selected was not able to develop the desired functionality within the project timeline, ultimately impeding the implementation process. From this they learned an important lesson: Make sure you understand the current functionality of a courseware product. Before selecting a vendor, confirm their ability to respond to your needs, develop unique functionalities, and meet your timelines.

- **The collaborative process offers time and space to examine and discuss teaching and learning more deeply.** Faculty involved in the project said that they were pushed to analyze their student and course needs and design the new course in a way that responded to those needs. Without the collaborative processes, these discussions likely would not have occurred. The discussions offered faculty a chance to reflect on their instruction and question their assumptions about instruction and assessments, leading to better experiences for faculty and students. "It was uncomfortable at times, but necessary," said a participant.

- **Content and instruction require "localization."** Faculty participating in the project sought to co-create a single course that could be used across institutions. However, as they moved through the design and development phases, they found that in order to achieve their goals, they required some variation in content and instruction due to local institutional contexts.

To learn more about the APLU English Composition Adaptive Courseware Development project, see the PLC's website.

PHASE 5: PILOT AND ITERATE

WHAT HAPPENS DURING PHASE 5?

In Phase 5 (Pilot and Iterate), the course instructors teach their course(s) using adaptive courseware in a limited number of sections in order to evaluate the effects of the changed instructional approach. The institution collects and evaluates data to determine successes and areas for improvement. The institution may then choose to *iterate* (conduct additional cycles of the pilot) before expanding the initiative to scale. This phase is necessary to evaluate the impacts of the courseware implementation, work out problems, and minimize the risk of complications when the project is scaled to all sections of a course.
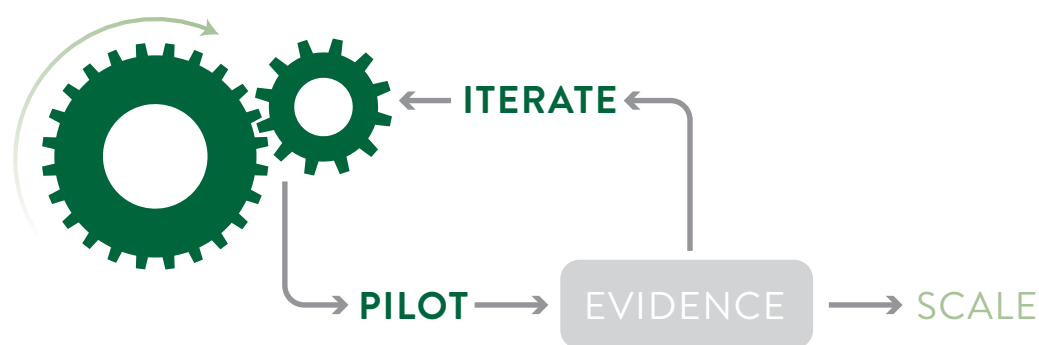
OBJECTIVES: WHAT SHOULD YOUR INSTITUTION ACCOMPLISH?

By the end of Phase 5, your institution should be able to:

1. Monitor and report on the instructional practices/solutions used and your progress toward implementation goals.

2. Articulate whether or not the results of pilot were in line with implementation goals. Why or why not?

3. Determine whether to move the implementation toward scale. Why or why not?

WHO IS INVOLVED IN PHASE 5?

PROJECT LEAD	EXECUTIVE SPONSOR	COURSE LEAD	COURSE INSTRUCTORS	ACADEMIC MANAGEMENT

TEACHING & LEARNING SUPPORT	VENDOR	RESEARCH & ANALYTICS	TECHNOLOGY SUPPORT	STUDENT SUPPORT

SUGGESTED ACTIVITIES

Based on the experiences of our partner institutions, you may find these activities helpful:

- **Complete the Pre-Flight Checklist.** Make sure you have all the essential pieces in place before launching your pilot.

- **Collect periodic participant feedback.** Schedule regular check-ins with course instructors participating in the pilot. Schedule midterm and end-of-term focus groups with students participating in pilot sections. Consider whether student facilitators for the student focus groups may produce more candid or productive feedback. If you filed with the IRB, make sure to use the documentation submitted to assess the pilot. (See the Appendix, page 43, for links to survey templates that may be helpful for collecting participant feedback.)

GUIDING QUESTIONS

- How will you document issues and concerns that arise during the pilot so that they are addressed in a timely manner?
- How can you incorporate qualitative data into the evaluation of your pilot?

- **Report progress.** Create reporting templates to share progress reports with various stakeholders. Note that different audiences (course instructors, Academic Management, Executive Sponsors and other institutional leaders) may have different needs in terms of reporting.

- **Analyze pilot data and share results.** Conduct data analysis in partnership with your Research & Analytics team to determine if the pilot met the goals outlined in your implementation plan, and to what extent. Also, take into account the information learned from check-ins with course instructors and students.

- **Meet with key stakeholders and decide how to proceed.** Following the conclusion of a pilot, your institution has several options for moving forward:
  - Revise the course or conditions and continue piloting at the same scale to see how results change.
  - Iterate with additional sections/instructors to determine how the courseware works in different contexts.
  - Explore your readiness to move to scale.
  - Redesign or terminate pilot.

Your institution will need to decide which stakeholders will be involved in the decision-making process as you figure out how to proceed with the implementation. Based on our partner institutions' experiences, the decisions most often included input from Academic Management, the Course Lead, Executive Sponsor, and Project Lead.

TIPS FOR SUCCESS: ADVICE FROM OUR PARTNER INSTITUTIONS

Stakeholder Engagement

- Communicate pilot results and specifically find ways to show how the pilot connected to departmental/institutional/faculty goals.

- Pilots should not run forever. If you iterate, make sure you are demonstrating how the pilot is evolving in support of broader goals and that you have an end goal in mind.

- If faculty at your institution are interested in research and publication, consider how the pilot may produce a publication opportunity that will support their career development.

Project Management

- Make sure all meetings with stakeholders are scheduled well in advance. Plan pre- and post-pilot debriefs with leadership and course instructors. Schedule vendor check-in(s) and confirm how to access vendor support if needed.

- If you need to make revisions between iterations, be sure to understand the availability of Teaching & Learning Support and Technology Support resources so that your timelines allow for the necessary changes before the next pilot begins.

- If you did not address this in Phase 2 (Discover and Decide), now is the time to ensure that your vendor is equipped to support implementation at scale. Ask about their successes and challenges supporting scaled implementations in the past. Confirm their ability to support additional redesigns and respond to ongoing user needs at a larger volume.

Institutional Impacts

- Resources from your Research & Analytics team should be available to support timely evaluation of the pilot. Make sure those team members are available to help collect and evaluate data as the pilot is coming to an end.

- Be prepared to support student advising and other student support departments to respond to student questions and needs as they arise.

Evidence-Based Decision Making

- Use the quantitative data on performance and cost in parallel with qualitative data from course instructors and students to inform decisions about whether to revise or scale the implementation.

CASE STUDY

LEARNING FROM PORTLAND STATE UNIVERSITY (PSU)

BACKGROUND

At PSU, the implementation team decided to pilot adaptive courseware in an Applied Statistics for Business course. The Office of Academic Innovation (OAI) at PSU helped build the course using the Realizeit™ platform and supported the instructor with management of the pilot.

SURPRISES DURING THE PILOT DROVE ADJUSTMENTS AND IMPROVEMENTS

Even after careful planning, unexpected problems arose during PSU's initial pilot. As students and instructors began using the courseware, they experienced early challenges including grading errors, typos, and system breaks. The instructor, students, OAI, and vendor teams acted quickly to identify and fix problems.

Once the initial problems were resolved, the instructor was surprised to see how the use of the adaptive courseware revealed student study habits. For example, the courseware required that students cover prerequisite material for a weekly lesson before moving ahead. Unlike a traditional course textbook, which allows students to skip material, the adaptive courseware forced students to review content that was essential for the course (a fact that they weren't always delighted to discover). From this, the instructor learned that some students are inclined to skip content that is important to course outcomes and that the use of courseware can help prevent this.

Students in the pilot course also noted several benefits of using the adaptive courseware. It allowed for flexible exploration and review of content, freeing them to move around in the course modules and retake review quizzes. This allowed them to expand their independent study.

"What surprised me," said the instructor, "is that even if students had a green star (indicating a grade of 81%–91%), they wanted to go back to get the blue star (91% or above)." When students retook assessments, they wanted new content and questions to work on. In response, the instructor partnered with colleagues to build a bank of questions for use in future terms.

To learn more about the PSU experience, check out this extended case study.

PHASE 6: SCALE

WHAT HAPPENS DURING PHASE 6?

During Phase 6 (Scale), an institution expands its use of adaptive courseware to its target level. This guide assumes that using adaptive courseware "at scale" means using it in all sections of the course(s) targeted. Scaling should draw on lessons learned from the Pilot and Iterate phase. The institution will need to use those lessons to develop a rationale and plan for a wide-reaching implementation.

This phase is an extended process. As your institution moves from scaling activities to sustaining activities, it will need to transition to creating policies, structures, and cultures that support sustained use of adaptive courseware. It will take time to move from smaller initiatives to a more systemic implementation process.
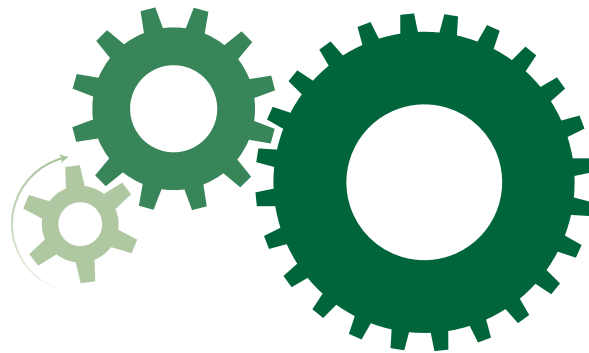
OBJECTIVES: WHAT SHOULD YOUR INSTITUTION ACCOMPLISH?

By the end of Phase 6, your institution should be able to:

1. Use the processes and lessons learned during Phase 5 (Pilot and Iterate) to lay the foundation for scaled use of adaptive courseware.
2. Use evidence to determine how you will expand or modify the use of adaptive courseware as you move toward scale.

WHO IS INVOLVED IN PHASE 6?

PROJECT LEAD	EXECUTIVE SPONSOR	COURSE LEAD	COURSE INSTRUCTORS	ACADEMIC MANAGEMENT
TEACHING & LEARNING SUPPORT	VENDOR	RESEARCH & ANALYTICS	TECHNOLOGY SUPPORT	STUDENT SUPPORT

SUGGESTED ACTIVITIES

Based on the experiences of our partner institutions, you may find these activities helpful:

Build the Case

- **Develop reports on pilot outcomes and effects.** Include quantitative data on specific outcomes from the pilot implementations and demonstrate progress toward implementation goals. Use qualitative feedback from course instructors and students to assess the impacts of the implementation as well. Make sure to include the positive and negative, and information on how negative effects will be mitigated in the future.

- **Forecast potential impacts from broadened use of adaptive courseware.** Work with your Research & Analytics team to determine whether pilot impacts can be used to reasonably predict the potential impacts from a scaled implementation. If so, project impacts on students, faculty, and the institution more broadly.

- **Identify institutional systems and policies that will be affected by scaled use of adaptive courseware and those that should change to support (and potentially sustain) scale.** Use your interviews with pilot participants and your scale approach to begin to map the stakeholders, systems, and policies that will be affected by use of adaptive courseware at scale. Consider things like potential impacts on physical spaces for class or study activities, network or data storage demands, financial aid, bookstore infrastructure, course schedules, instructor load, instructional design capacity, and more. Create a plan to "scale up" these institutional resources or change policies to enable the ongoing use of adaptive courseware at scale.

- **Consider the budgetary implications of scaled implementation.** Look at the expected sources and uses of funds for the implementation. If sources of funds include sources that will not recur (e.g., a nonrenewable grant from an external funder), determine whether that funding can be replaced by another source and how you will secure those funds. If the funding can't be replaced, determine how the implementation will be affected when the budget declines.

- **Calculate the potential return on investment (ROI) from a scaled implementation.** Work with leaders from across your institution to calculate potential ROI. This involves comparing your institution's prospective investment with the anticipated positive impacts of the implementation. Explore the Making Digital Learning Work report by Arizona State University and the Boston Consulting Group for information on how six universities are measuring the impact of their investments in digital learning.

Develop Your Approach for Scaling

- **Account for culture.** Instructors' perceptions of an adaptive courseware initiative can make or break your implementation. Look at how instructors make decisions, develop courses, and support each other for clues on how your institution might catalyze scaled adoption of adaptive courseware.

- **Work with stakeholders from across the institution to decide how and how quickly to scale.** Based on evidence, decide if your original definition of what it means to implement "at scale" still makes sense. Decide how to expand to new sections, courses, programs, etc. Consider whether scaling should occur gradually, or in one major leap. Stakeholders to include in these conversations are: Executive Sponsor, Project Lead, Course Lead, Academic Management, Teaching & Learning Support, Technology Support, and more.

- **Develop guidelines for participation in the scaled implementation.** Determine whether you would like to extend invitations or mandates for participation in the scaled implementation, whether any incentive will be offered to participating faculty, and whether nonadaptive alternatives will be available to students.

GUIDING QUESTIONS

- Do instructors already have avenues for sharing what happens in their classroom and discussing teaching practices? Can you tap into these existing structures as you expand the implementation?

- Are pilot course instructors available to train other instructors?

- Who will take on the role of instructor training and student success monitoring as the adaptive courseware initiative expands?

SCALING LOOKS DIFFERENT
IN DIFFERENT IMPLEMENTATIONS
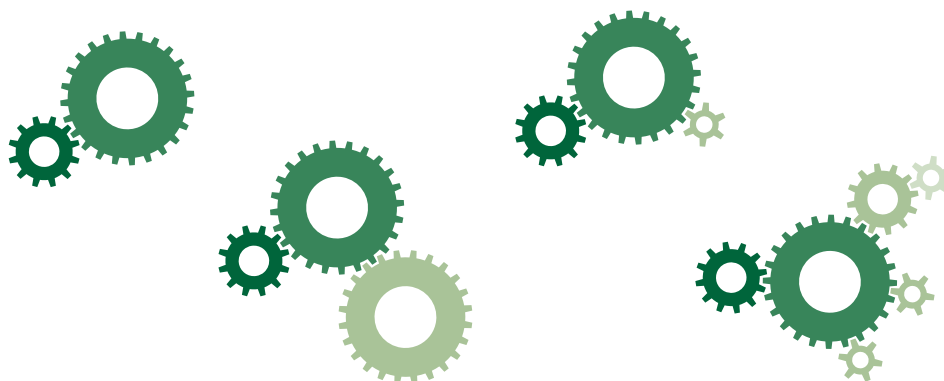
Communicate

- **Present the case for adaptive courseware to faculty and students.** Determine how much of the "case" you built for implementation should be shared publicly to earn buy-in from your faculty and students. Articulate your rationale for expanding the implementation, including potential positive and negative impacts on faculty and students, and how the implementation will support broader institutional goals.

- **Share the plan for implementation and progress updates.** Your stakeholder group becomes much larger as you scale your implementation. Keep stakeholders informed and engaged by sharing information about plans and changes through town hall meetings, regular email updates, and/or a website.

- **Educate new stakeholders over time.** Faculty and administrator turnover, as well as expansion of the implementation to new groups, will make ongoing communication and education part of scaling even when the implementation is no longer expanding. Develop a training plan that accounts for varying levels of familiarity and comfort with adaptive courseware. Continue to update the plan with results from your implementation to build buy-in and disseminate new discoveries or best practices.

Execute and Evaluate

- **Evaluate the impacts of adaptive courseware in every course.** Build on the evaluation techniques you used in the Pilot and Iterate phase to evaluate the impact of using courseware in new contexts. Don't be afraid of data that shows no progress or negative effects; learn from it.

- **Use your learning to further solidify the case for adaptive courseware use.** Learn from the implementation to support adoption decisions in other areas of your own institution or to inform implementations of other types of digital learning. Share your findings with other institutions or publish openly to help build a broader evidence base for the use of adaptive courseware.

TIPS FOR SUCCESS: ADVICE FROM OUR PARTNER INSTITUTIONS

Stakeholder Engagement

- Scaling will take the adaptive course approach beyond early adopters. Educating and supporting the general population of faculty will be a more significant undertaking than preparation and support for the pilot. Use peers that have experience from the pilot to help onboard new instructors.

- Create or enable opportunities like learning communities to allow instructors to share experiences and build cross-institutional understanding of courses and practices that embed adaptive courseware.

- It's important to note that reaching scale doesn't mean that your implementation has achieved a steady state that will self-sustain. Maintaining the implementation requires ongoing work to keep stakeholders and leaders engaged and to continue to build the case for the use of adaptive courseware.

Project Management

- Consider the extent to which the scaled implementation will require all course instructors to use the courseware in the same way. If consistency of use is needed for success, create a instructor guide and model for observation or review of teaching practices to ensure adherence to the instructional model by all participating instructors.

Institutional Impacts

- Be aware that positive impacts on student outcomes can have some negative impacts on program or departmental revenue. As completion rates improve, you may find that fewer students are repeating courses, thereby reducing the enrollment numbers and revenue that those courses generate. Institutional leaders and Academic Management should consider whether their budget and revenue attribution models create incentives or disincentives for improving student outcomes.

Evidence-Based Decision Making

- Effective and consistent use of data by course instructors takes practice. Offer training and be aware that instructors may require a few terms, and ongoing support, to use the data and analytics offered by the adaptive courseware effectively.

- Your institution can play a role in improving evidence-based decision making for other institutions. Publish your results on your website or in journals, present at conferences, and encourage course instructors to complete additional analyses and publish their findings.

- Evidence-based decision making is an ongoing process. Your evidence base should include results from your implementation as well as new and emerging research on learning, new products and practices, and experiences of other institutions.

CASE STUDY

LEARNING FROM ARIZONA STATE UNIVERSITY (ASU)

BACKGROUND

College Algebra is a barrier on the path to success for many students. At ASU, over 5,000 undergraduates enroll in the course each year. However, the historical course success rate (meaning students receiving a C or better) was in the mid-60% range, indicating the course needed significant improvement. Additionally, many students did not place into College Algebra and had to pass through a non-credit developmental course first.

HOW ASU REMOVED BARRIERS AND INCREASED UNDERGRADUATE SUCCESS

To address the challenge that College Algebra presented, ASU redesigned the course for fall 2016 and incorporated three key changes recommended by faculty: elimination of the developmental math course that had preceded College Algebra for many students, implementation of the McGraw Hill ALEKS® adaptive courseware, and an addition of a flexible "stretch" semester. Additional information on the rationale for each change is provided below.

- **Eliminating developmental math:** The recommendation to eliminate the developmental math course was based on the latest research in developmental education. ASU data indicated that the course offered no demonstrable benefit in the College Algebra course outcomes. Furthermore, requiring students to take an additional semester of noncredit math caused them to fall behind in their degree program.

- **Implementing the McGraw Hill ALEKS adaptive math system:** ALEKS provided each student with a personalized study plan based on his or her incoming knowledge and provided remediation when needed. This allowed students who entered the course with different levels of preparedness to all receive customized support.

- **Adding a "stretch" semester:** A "stretch" semester allowed students who needed more time to complete the course to be given a "continuation" grade and the ability to take the class again for free the following semester. During that "stretch" semester, students were able to pick up where they left off in the ALEKS course, which helped them maintain momentum and complete the course successfully at no additional expense.

The combination of these three approaches was key to increasing the student success rate by 20% (when compared with the prior year's fall cohort). This translated into over 800 additional students passing the course during the 2016–2017 academic year as compared to the prior year. This shows that a successful implementation is not just about the design of a course, but also the development of supports and policies that allow the adaptive course to be successful. It also shows the impact of giving faculty a leading role in the implementation process.

CONCLUSION

ADAPTIVE COURSEWARE IS OPENING NEW DOORS

Implementing adaptive courseware is a significant undertaking, requiring collaboration and openness to change from across an institution. However, the experiences of the partner institutions have shown that, when implemented effectively, the benefits of using adaptive courseware are well worth the effort. Though this guide dedicates a significant amount of space to project management tasks, institutions should not lose sight of the end goal of all these tasks: to change instructional practices and improve student outcomes.

The process of designing and implementing adaptive courseware can initiate conversations about teaching and learning that may be long overdue at many institutions. It also allows institutions to shift their educational offerings so students have access to more personalized learning experiences that better meet their needs. Finally, it gives faculty access to new kinds of data, which can help them personalize their courses and better serve students. These outcomes are powerful, but they are not easy to achieve. Adopting new technology and teaching methods requires vulnerability, curiosity, and an overwhelming amount of support. Faculty are at the forefront of this process. They are referenced in every phase in this guide because their role cannot be overstated. *Faculty are key to the success of your initiative.*

We hope that the experiences and tips from the APLU partner institutions will give your institution a head start and a helpful push toward achieving your goals. While this guide is based on experiences from only a handful of institutions, we believe that it includes important best practices that translate across a range of institutional environments. We also recognize that it may not serve every constituency. For that reason, we will work to develop additional resources over time to support different types of institutions and student bodies.

BECOME PART OF OUR COMMUNITY

Over the next two years, Every Learner Everywhere plans to develop and release a range of openly available resources to support institutions as they implement adaptive courseware and other digital learning approaches. It intends to support a large community of educators with accessible resources, higher education events, and other activities. We hope you will become part of this community, offer your insight, and join in the broader conversation about improving postsecondary student outcomes.

> **Our goal is to create resources that are useful for our community. We'd love your feedback. To help us improve this guide, please fill out the feedback form at: http://eleassets.webflow.io/feedbackform. If you have questions, contact us at: eleassets@wiche.edu.**

APPENDIX

A.   ADDITIONAL READING AND RESOURCES

Institutions may find these additional resources helpful as they navigate each phase of implementation. The resources are organized by phase and include additional reading, relevant research, templates, and examples that were not included in the body of the guide.

Phase 1: Establish Support

7 Things You Should Know About Adaptive Learning, EDUCAUSE

Learning to Adapt 2.0: The Evolution of Adaptive Learning in Higher Education, Tyton Partners

High-Tech, High-Touch, Serving Student Needs at Scale. A Digital Learning Report and Workbook, Intentional Futures

Predictive Analytics in Higher Education, New America

Phase 2: Discover and Decide

Annotated Bibliography on Adaptive Learning, GSU Center for Excellence in Teaching & Learning

Example vendor RFI

Phase 3: Design

Example MOU from CSU. *This MOU assumes grant funding for the adaptive courseware initiative.*

Example MOU. *This MOU assumes grant funding for the adaptive courseware initiative.*

Adaptive Courseware Development Task List, ASU

Active Learning: A Practical Guide for College Faculty, Maryellen Weimer

Phase 4: Develop

Adaptive Learning: Research-Based Principles for Developing Effective Courses, WCET Frontiers

Course Design Rubric Standards, Quality Matters

Phase 5: Pilot and Iterate

Instructor Survey, Digital Promise. *This instructor survey is designed to collect information about the implementation and conditions for the use of adaptive courseware. The survey was administered to 1,005 instructors in 449 different higher education institutions during the three-year period from 2015 to 2017. Over 40% of the institutions were public two-year colleges with the remainder being a mix of public and private, traditional or online, four-year institutions.*

Student Survey, Digital Promise. *This survey is designed to collect information about students' demographic background and experiences when using adaptive courseware.*

Student Survey and Focus Group Guide example, UM

OLC Quality Course Teaching & Instructional Practice Scorecard, The Online Learning Consortium

Phase 6: Scale

Defining Digital Courseware's Success in Terms of ROI, EdSurge

Return on Investment Toolkit, EDUCAUSE

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- Digital Promise
- EdSurge
- EDUCAUSE
- Intentional Futures
- Online Learning Consortium
- Tyton Partners
- WICHE Cooperative for Educational Technologies (WCET)

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