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White Paper

The Next Generation of Digital Curriculum in Pennsylvania

Pennsylvania

PLATO®
COURSEWARE

Contents

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Executive Summary

State and national education policies are increasing demands on Pennsylvania's students and the schools that serve them. At the same time, the students in Pennsylvania's classrooms are more diverse, more dynamic, and more technologically savvy than ever. Edmentum's Plato Courseware is designed to help schools in Pennsylvania meet the needs of today's learners and to keep pace with evolving educational policies.

Plato Courseware is a standards-based, online learning program grounded in a tradition of solid research, sound pedagogy, and applied innovation. The program authors develop rigorous, relevant curricula that challenge students, and the program's 21st century approach is designed to complement a variety of learning environments. Plato Courseware can be used in a lab setting, a blended model in which online courses supplement the traditional classroom, or a completely virtual experience.

Plato Courseware has been reviewed and found to meet high standards for quality set by numerous state and national organizations. The program is designed to deliver individualized learning to students and to provide teachers with essential student data to tailor their instruction.

Plato Courseware in Pennsylvania

The Pennsylvania Department of Education (PDE) has developed a rigorous review process for its Online Course Catalog (OCC), which allows providers offering online courses to feature them through PDE's website. So far, the review process has been completed for five courses from Plato Courseware—algebra I, biology, AP® biology, AP® calculus, and grade 10 English language arts—and all five subjects have been approved for inclusion in the OCC. PDE reviews courses against the International Association for K–12 Online Learning (iNACOL) rubric to ensure high quality, rigor, and alignment to the iNACOL National Standards for Quality Online Courses and PDE's Assessment Anchors and Eligible Content associated with the Keystone Exams. As Pennsylvania expands the review process, Edmentum will continue to ensure that high-quality Plato Courseware content is available to Pennsylvania students.

In 2013, 131 unique institutional entities used Plato Courseware in Pennsylvania. An institutional user could be a district, an individual school—including traditional public schools, alternative schools, and charter schools—or a college. Traditional school districts made up 45 percent of Pennsylvania's Plato Courseware users during 2013, with these districts giving multiple schools throughout the district access to online courses. The most commonly licensed product in Pennsylvania during 2013 was the Secondary Academic Library, which contains a wide variety of secondary courses, including English, algebra, advanced calculus, and advanced chemistry.

In 2013, Plato Courseware delivered nearly 1 million learner sessions to almost 26,000 individual Pennsylvania students. Edmentum provides Pennsylvania schools with a stable connectivity platform, maintaining enough servers and network bandwidth to successfully enable large numbers of students to collectively spend many hours working toward completion of Plato Courseware.

Edmentum's Commitment to Research and Results

Edmentum is actively engaged in ongoing research to determine how to provide the best learning experiences possible for all students. That includes researching online teaching and learning practices as well as the effectiveness of current Plato Courseware in a variety of school settings. This paper presents results from a third-party study conducted by the well-regarded Marzano Institute and case studies that represent the diverse types of school districts using Plato courses and seeing results. Here are just two examples of case-study research Edmentum is engaged in around the country:

East Chicago Central High School is a large urban school using Plato Courseware to establish a blended learning program for learners struggling on the Indiana End of Course Assessments. In their school, Plato Courseware works alongside in-person instruction. Since implementing this blended model, East Chicago Central has seen a steady rise in high school graduation rates. More information about their success is presented in the case studies section at the end of this report.

Figure 1: Graduation Rate Trend
East Chicago Central High compared to Indiana State trends

Legend: ● Indiana ● East Chicago Central High

Data:
- 2008–09: Indiana 83%, East Chicago Central High 56%
- 2009–10: Indiana 86%, East Chicago Central High 52%
- 2010–11: Indiana 87%, East Chicago Central High 67%
- 2011–12: Indiana 89%, East Chicago Central High 79%
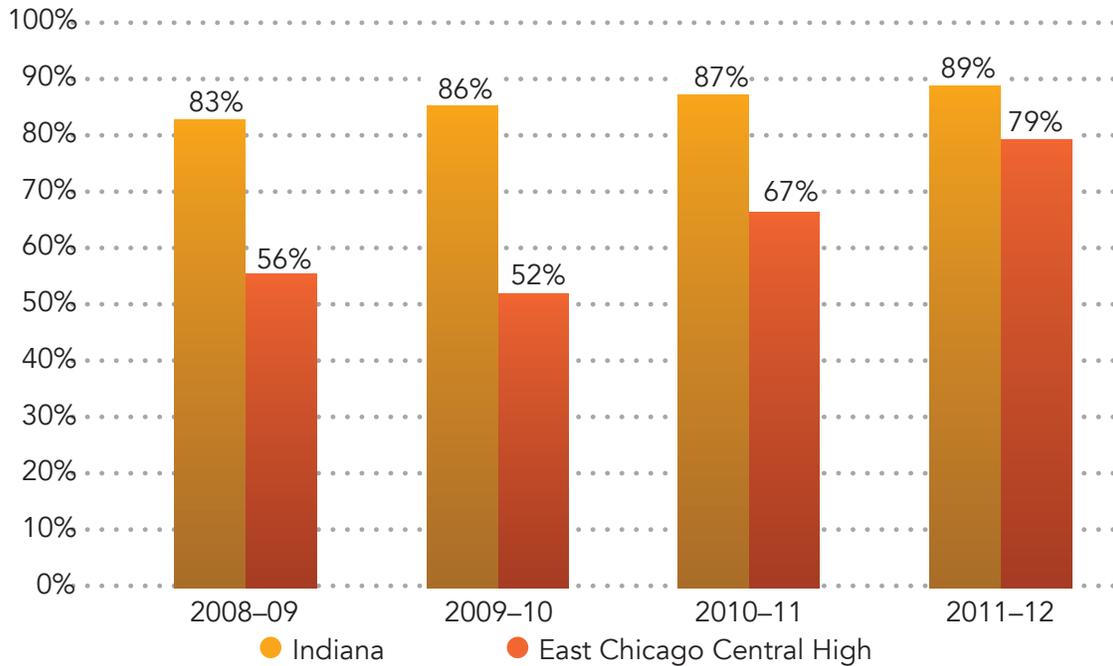
Bellevue School District is a small rural district in Iowa working to improve students' state test scores. Recently, the district launched its 1:1 program, which provides each student with a personal laptop computer. Teachers are now using Plato courses to "flip" their classrooms, with students accessing course material at home and working at their own pace. Since the program began, scores on state tests have already improved from 2012 to 2013. More information about Bellevue's implementation is provided in the case study at the end of this report.

Figure 2: Percentage of Bellevue Students Proficient on State Tests

Legend: ● 2012 ● 2013
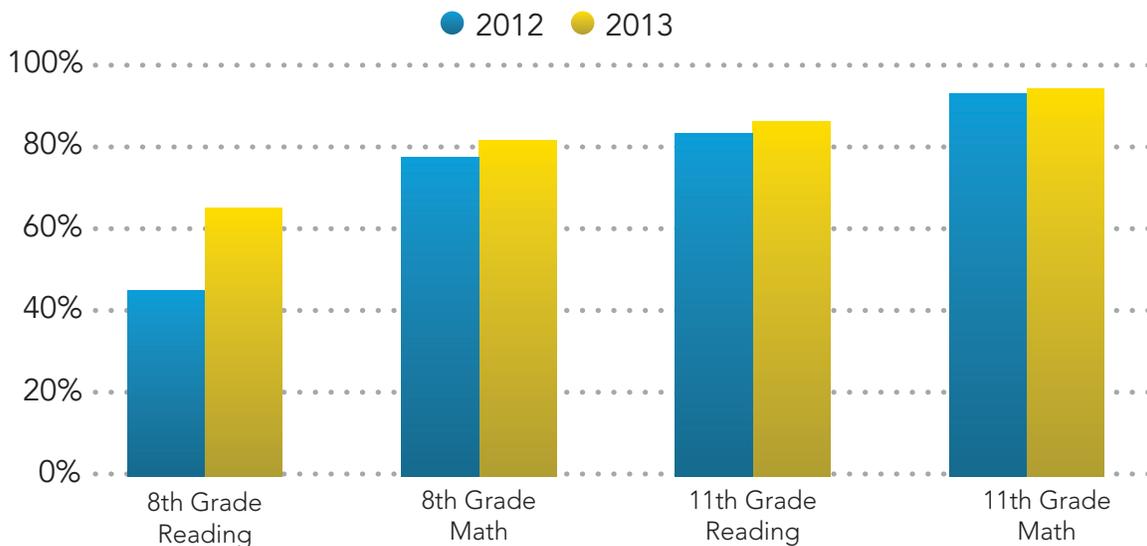
The Next Generation of Online Teaching and Learning

The potential of online learning to improve education is clear. Organizations such as the Foundation for Excellence in Education are pushing to increase access to digital learning for all students. *Digital Learning Now!*, a national campaign of the foundation, is founded on the idea that digital learning has the power to individualize learning to meet each student's needs, making education more challenging, engaging, and relevant. The campaign's *2013 Digital Learning Report Card* pushes policy makers in each state to enact policies that will facilitate high-quality digital learning for all students, including access to rigorous online courses. Edmentum is proud to provide high-quality online content to schools and students and to be a part of the movement to improve education for all students through online learning.

Today's classroom is no longer bound by four walls and run by a single instructor. Online learning is no longer something separate from traditional schooling. Students can move seamlessly between online learning and classroom learning. Teachers rely on online platforms to aid in all levels of instruction, such as capturing and analyzing real-time student performance data or delivering highly personalized content to all levels of students. This integration of technology and classroom practices is referred to as blended learning, and it can take on many forms. The creators of Plato Courseware understand the diverse needs of students and teachers today and have created an online platform that adapts to those needs at every level of blended learning. Table 1 was created by the International Association for K–12 Online Learning (iNACOL) to describe the levels of blended learning. The added last row shows how Plato Courseware can be used at varying levels of blended learning.

Table 1: The Defining Dimensions of Blended Learning Models

Level of Blended Learning

Characteristics Driving the Changing Roles of Educators			Less Online Instruction	More Online Instruction	Mostly Online Instruction
	Characteristics of Instructional Models	**Instructional Material Level**	Learning Object	Unit/Lesson	Single Course	Entire Curriculum
		Instructional Resources	Course minimally uses digital content, resources, and tools to supplement instruction	Digital content, resources, and tools expand and enhance the curriculum and content		Use of digital resources and tools are integral to content, curriculum, and instruction
		Assessment	Whole-class assessments, used primarily in the classroom during the school day, as the primary means of feedback	A combination of traditional and online assessments are used inside and outside the classroom		Greater amount of digital, real-time data, and feedback allow for individualized instruction
		Communication (Student/Teacher and Student/Student)	Occurs primarily synchronously and in the physical classroom	Is a mixture of synchronous and asynchronous and may be in the physical classroom or online		Occurs primarily asynchronously and online or from a distance
	Student-Centered Instruction	**Attendance Requirements**	Students are required to attend a physical classroom 5 days a week	Students attend a physical classroom fewer than 5 days a week and work online at other times		Students have flexible physical classroom and/or location attendance requirements
		Student Learner's Role	Student is primarily the recipient of teacher-provided instruction; teacher sets day-to-day pace		Student takes active role in learning with reliance on digital content, resources, and tools; student has more control of own pace	
		Individualization of Instruction	All students are expected to complete same instructional pathway	Students engage with digital content to customize their instructional paths		Students engage with digital content and have multiple pathways that are competency based and not tied to a fixed school calendar

(Table header note: The column header text under "Level of Blended Learning" reads: Less Online Instruction — More Online Instruction — Mostly Online Instruction. The table is divided into two sections labeled vertically: "Characteristics of Instructional Models" and "Student-Centered Instruction," both under "Characteristics Driving the Changing Roles of Educators.")

School Considerations				
	Instructional Support Models	"Direct student learning" through traditional teacher roles and staffing models	"Facilitate student learning" through a team approach with a significant reliance on technology-based tools and content	"Coordinate student learning" through the expanded use of technology-based tools and content as well as the effective use of outside experts and/or community resources
	Instruction Schedule and Location	Fixed daily schedule, instruction primarily in physical classroom	Mixed schedule of online and physical instruction	Highly flexible schedule, with instruction possible 24 – 7. Learning centers support instruction
	Access to Academic Student Support	Support is school based and provided primarily by the teacher during the class period		Support structures (e.g., online tutoring, home mentors, and technical support services) in place 24 – 7, in addition to teacher support
	Technological Infrastructure	School or classroom based with students using shared classroom computer resources; access to infrastructure ends with class period	Available across school campus with students checking out computers from a lab or bringing their own; access to infrastructure is during school hours	Available on and off campus with students using their own devices; access to infrastructure is 24 – 7

© International Association for K–12 Online Learning

The Role of Plato Courseware	Pieces of Plato Courseware are fit into the whole-class curriculum. One module is used to teach a specific skill or provide content on a topic. Individual topic quizzes or unit tests may be used for whole-class assessment. Plato Courseware is accessed during class time. Content supports teacher-driven instruction.	Subgroups of students needing advanced or remedial content may use Plato Courseware as their primary instruction. Plato Courseware may be used as a flipped classroom model, with students accessing course content outside the classroom.	Students use Plato Courseware completely online and at their own pace, accessing the content in or out of school. Course credit is based entirely on Plato Courseware completion.

Courseware That Supports Best Practices in Online Learning

Standards Alignment

Research has shown that a strong relationship exists between alignment of instructional content with assessments and student achievement gains: the better that instructional content aligns with assessments, the higher student achievement can be (Gamoran, Porter, Smithson, & White, 1997). This is why Plato Courseware is developed to align completely with rigorous state and national standards, as well as assessments.

Many states, including Pennsylvania, are in the process of writing and adopting new, more rigorous, college- and career-ready learning standards and assessments. Plato Courseware authors have gone beyond traditional alignment procedures to develop continuously updated course content from an in-depth analysis of Pennsylvania standards. The content has been built from the ground up based specifically on the standards, which ensures complete and up-to-date standards coverage.

Plato Courseware Online Model

Plato Courseware has always used a mastery-based model to build the content at the heart of its courses and curriculum. Plato Courseware provides semester-long courses on a range of core and elective subjects. Developers start with a curriculum structure built around discreet learning objectives. Then, each learning module, or lesson, is focused on one individual objective. Each module includes an introduction to the new material, a chance to practice or apply new knowledge, and an opportunity to demonstrate mastery of the objective before progressing to the next module. This structure is built into units of related material and includes pretests to assess prior knowledge as well as posttests and end-of-semester tests to confirm mastery for broader levels of content beyond the lesson.

Course Structure

Figure 3 illustrates the basis of the curriculum model.

Figure 3: Plato Course Model
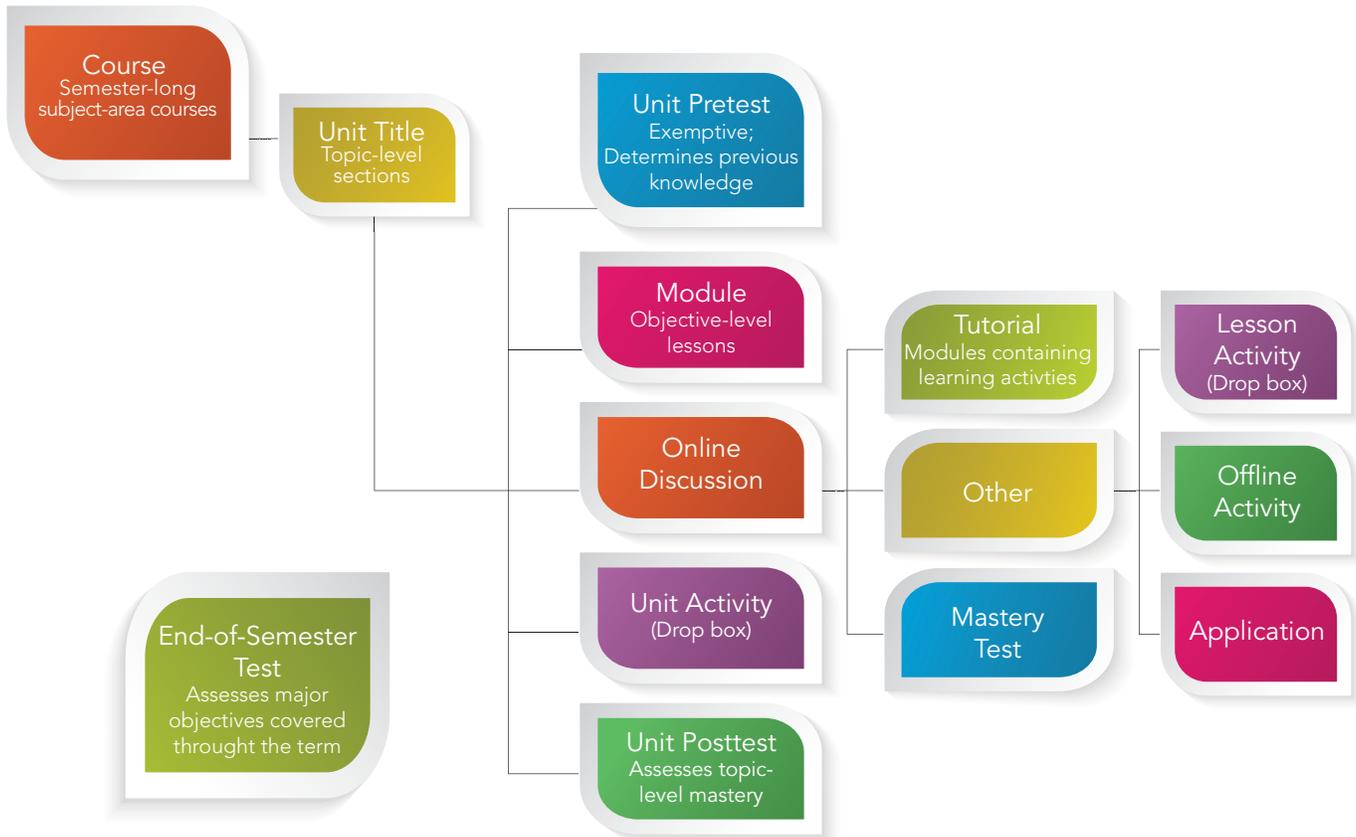
To understand the model, it's important to look closely at the structure and the details that support it.

Course Structure

- A scope and sequence comprehensively addresses national and state standards.
- A course, unit, and module (lesson) structure groups learning objectives into meaningful subsequences based on curriculum topics or themes.

Unit Structure

- **Unit pretests** are exemptive tests that determine previous knowledge (see *Assessments* below).
- **Learning modules** provide specific instruction (see *Module Structure* below).
- **Online discussions** allow teacher-to-student and student-to-student discussion and debate about topics that require students to synthesize knowledge acquired during lesson mastery and apply critical-thinking skills to answer questions, form opinions, express ideas, and respond to the ideas and opinions of others.
- **Unit activities** offer students the chance to demonstrate higher levels of skill by completing a rich task and submitting the resulting project, paper, essay, data, research, or presentation to the teacher via an online digital drop box.
- **Unit posttests** assess topic-level mastery at the end of each unit (see *Assessments* below).

Module Structure

Individual modules are designed to reflect the specific type of knowledge or skill addressed within the lesson (e.g., procedural knowledge or declarative knowledge). Module design elements include the following:

- **Tutorials** are designed to help learners acquire and build knowledge.
  - Tutorials include a variety of interactive practice activities, such as exploratory timelines and clickable diagrams. Judged activities include multiple-choice, matching, fill-in-the-blank, drag-and-drop, and multistep problem-solving questions. Other learning resources include embedded videos and links to valuable educational resources.
  - Some tutorials are specifically designed to help learners research, build, and deepen their knowledge. They are sometimes labeled "Explorations."
- **Other activities** often are added to a module to meet specific learning needs.
  - Lesson activities are similar to the unit activities described above, but they are focused on lesson-level objectives.
  - Offline activities are similar to lesson activities but use a PDF file format and do not employ the drop box.
  - Application activities allow learners to apply knowledge to new situations and real-world problems.
- **Mastery tests** conclude each module (see *Assessments* below).

Assessments

Each Plato Courseware product includes multiple assessments designed to continuously check understanding, measure mastery, ensure knowledge retention, and predict preparedness for course exams. The assessments include these tests:

- **Mastery tests** measure whether students have mastered lesson objectives and are prepared to move on to the next learning objective in the instructional sequence.
- **Unit pretests** measure students' knowledge of the unit learning objectives before beginning the lesson instruction and allow students to test out of lessons by demonstrating mastery. Unit pretests are most often used when accelerated learning (e.g., credit recovery) is important.
- **Unit posttests** measure students' understanding of both the basic knowledge and the higher-level skills within each unit. They help ensure that students are building and retaining knowledge from lesson to lesson throughout the unit.
- **End-of-semester tests** measure students' mastery and retention of the instruction in every lesson and unit within the semester.

Rigor, Relevance, and Depth of Knowledge

In 1956, Benjamin Bloom worked with a group of educational psychologists to develop a taxonomy that classified six levels of learning: knowledge, comprehension, application, analysis, synthesis, and evaluation.

Bloom's theories have been refined over the decades. In the 1990s, cognitive psychologist Lorin Anderson worked with educational psychologist David R. Krathwohl to publish an adaptation of Bloom's work that reflected a taxonomy more closely tied to 21st century learning. The Anderson and Krathwohl (2001) revision maintained Bloom's six levels but labeled each level with verbs rather than nouns, reconceptualized "synthesis" as "creating," and moved "creating" up to the highest level in the taxonomy. The six levels of learning in the Anderson/Krathwohl taxonomy are remembering, understanding, applying, analyzing, evaluating, and creating.

Building on the work of Bloom, Anderson, and Krathwohl, the International Center for Leadership in Education, under the leadership of Dr. Bill Daggett, created its Rigor/Relevance Framework model for learning and student achievement based on two dimensions. The first dimension is rigor, which refers to academic rigor, or level of knowledge and learning, as defined in the taxonomies of Bloom and Anderson/Krathwohl. The second dimension is relevance, meaning the ability to apply concepts or skills to solve real-world problems. Relevance, as defined in the Application Model of the Rigor/Relevance Framework, has a five-level continuum:

- Level 1–knowledge in one discipline
- Level 2–applying knowledge in one discipline
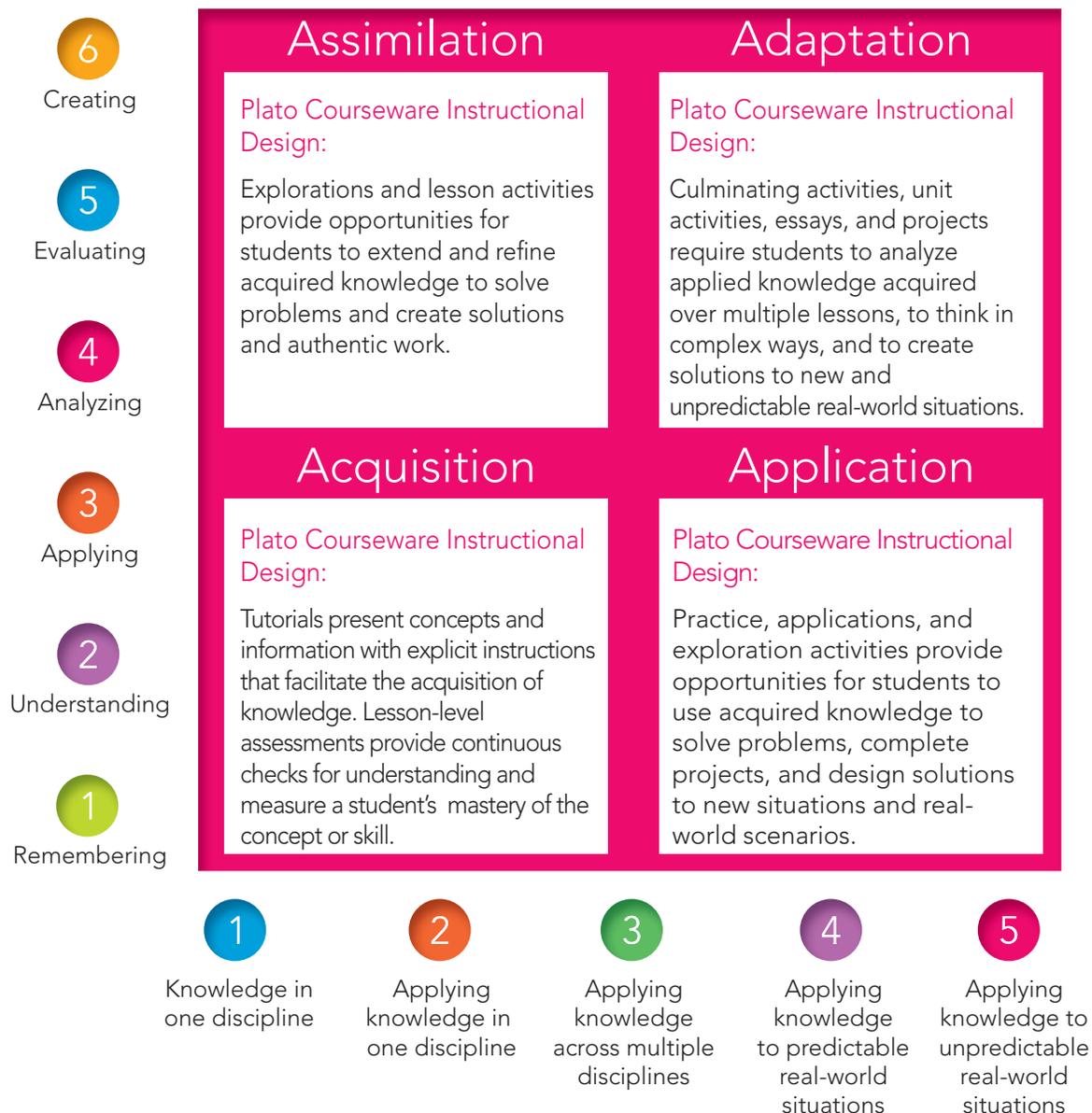- Level 3–applying knowledge across multiple disciplines

■ Level 4–applying knowledge to predictable real-world situations

■ Level 5–applying knowledge to unpredictable real-world situations

Daggett's model demonstrates the application of knowledge or skills from the lowest level of knowledge within one discipline to the highest level, where knowledge is applied to real-world situations with unpredictable outcomes.

Plato Courseware is designed to explicitly incorporate the multiple levels of rigor and relevance within an integrated online learning environment. Each course incorporates basic and higher levels of learning within the rigor and relevance dimensions in Daggett's application model. Table 2 illustrates how Plato Courseware's instructional design applies the Rigor/Relevance Framework and Application Model to create rigorous 21st century online courses. Acquisition, in the bottom left corner, involves low levels of rigor and relevance — remembering and understanding knowledge in one discipline. Adaptation, in the upper right corner, represents high levels of rigor and relevance — creating, evaluating, and applying knowledge in real-world situations.

Table 2: A Framework for Plato Courses

Creating (6) / Evaluating (5) / Analyzing (4) / Applying (3) / Understanding (2) / Remembering (1)

Assimilation

Plato Courseware Instructional Design:

Explorations and lesson activities provide opportunities for students to extend and refine acquired knowledge to solve problems and create solutions and authentic work.

Adaptation

Plato Courseware Instructional Design:

Culminating activities, unit activities, essays, and projects require students to analyze applied knowledge acquired over multiple lessons, to think in complex ways, and to create solutions to new and unpredictable real-world situations.

Acquisition

Plato Courseware Instructional Design:

Tutorials present concepts and information with explicit instructions that facilitate the acquisition of knowledge. Lesson-level assessments provide continuous checks for understanding and measure a student's mastery of the concept or skill.

Application

Plato Courseware Instructional Design:

Practice, applications, and exploration activities provide opportunities for students to use acquired knowledge to solve problems, complete projects, and design solutions to new situations and real-world scenarios.

1. Knowledge in one discipline
2. Applying knowledge in one discipline
3. Applying knowledge across multiple disciplines
4. Applying knowledge to predictable real-world situations
5. Applying knowledge to unpredictable real-world situations

Individualizing Learning for Each Student

Individualized learning is a primary goal of a range of instructional design theories. For example, Scandura's Structural Learning Theory (Scandura, 1973, 1976), Collins and Stevens' Cognitive Theory of Inquiry Teaching (Collins & Stevens, 1982, 1983), and Merrill's Component Display Theory (Merrill, 1983) all have certain factors in common when it comes to tailoring instruction to each individual in a group or class. The commonality between them lies in the presence of these three elements:

- using an instructional approach that breaks the content to be taught into a structure that includes goals or objectives (they don't all use those terms, but the concepts are similar);

- providing regular opportunities to assess individual learners in terms of whether they have mastered a particular goal or set of goals; and

- prescribing content specific to the individual learner that includes new material only for the goals yet to be mastered.

Some prefer to describe this approach as personalized learning, as the coursework and learning can be done in collaboration with others, not just as an individual. The important aspect is that the instruction follows a path that meets the individual needs of a learner, regardless of the instructional method used (group work, discussion, projects, tutorials, etc.). In *Disrupting Class* (2010), Christensen, Johnson, and Horn base much of their advocacy for innovation in education around a tension between "customization of learning" and the standardized model of school institutions. In their analysis, they state, "The proper use of technology as a platform for learning offers a chance to modularize the system and thereby customize learning" (Christensen et al., 2010, p.38).

For many years, Plato Courseware has used a mastery-based model to build the content at the heart of the courses and curriculum delivered on its system. This instructional model incorporates three basic elements from the approaches described above:

- Plato Courseware breaks up content into goals and objectives. Each learning module is built at a single-objective level and provides an opportunity to practice the material being taught.

- Students are asked to demonstrate mastery of that objective through a mastery test or project. If mastery is not achieved, the material can be repeated and a new assessment of that objective can be taken to demonstrate mastery.

- Plato Courseware includes unit-level pretests of the objectives covered within that unit. If mastery is demonstrated on any objective in that unit, the learner is exempted from the lesson that teaches that objective. In this way, learning is customized for the needs of that individual student.

Specialized Courses to Fit Every Student's Schedule

Online courses have long been used as a credit recovery solution. However, the potential for online courses to increase course offerings for students seeking first-time credit in specialized areas is growing. Often, schools and districts are not able to offer every course a student is looking for because of enrollment numbers or scheduling constraints. In some cases, this can limit student options. Research has found that using online courses to supplement district course offerings can make a positive and lasting impact on student achievement (Heppen et al., 2011). Plato Courseware gives districts the ability to offer a wide array of specialized courses to any student at any time. Course offerings include:

- **Advanced Placement® (AP®)**: 10 semesters of AP® courses that address 100 percent of the standards defined by the College Board

- **Beyond High School**: 27 semester courses designed specifically to prepare students for the leading college entrance and placement tests as well as career certification and work skills exams

- **Career Technical Education (CTE)**: courses that cover the skills students need to compete in today's workforce; currently, CTE courses are available in these areas:
  - agriculture, food, and natural resources
  - architecture and construction
  - arts, audio/video technology, and communications
  - business, management, and administration

- ° finance
- ° health science
- ° hospitality and tourism
- ° human services
- ° information technology
- ° law, public safety, corrections, and security
- ° manufacturing
- ° marketing
- ° science, technology, engineering, and mathematics
- ° transportation, distribution, and logistics

For a complete and current listing of courses, visit www.edmentum.com and contact a solutions specialist.

Alignment to State Quality Standards

Many state departments of education and other organizations have developed lists of online course content that meets high-quality standards. Plato Courseware has been reviewed by several of these organizations and has been found to meet their standards. Plato Courseware has been approved by the following bodies:

- Pennsylvania Department of Education
- California Learning Resource Network
- Hawaii State Department of Education
- Maine Department of Education
- Nevada Department of Education
- North Dakota Department of Public Instruction
- Oklahoma State Department of Education
- University of California "a-g"
- Washington Learning Source

Quality Matters™ Program

The Quality Matters Program is a leader in quality assurance for online education and has received many awards for its peer-based assessments and continuous-improvement philosophy. Its rubrics for online and blended course design have been adopted by more than 800 colleges and universities, K–12 schools and systems, and other academic institutions, and they continue to influence many others. The Quality Matters design standards are based on widely agreed-upon best practices and are supported by a growing body of research. More information is available at www.qualitymatters.org.

The Quality Matters K–12 Publisher Rubric was created to address the need for a set of standards for the design of online courses and to assist school boards, individual schools, and teachers in selecting courses for adoption. Based on adherence to existing respected standards for K–12 online education, the K–12 Publisher Rubric serves as a guide to evaluate and improve publishers' courses.

Select Plato courses were submitted for review and were awarded a Quality Matters Certificate of Course Recognition. The courses were evaluated based on the standards outlined in the Quality Matters Grades 6–12 Publisher Rubric, 2013 Edition, which requires a 92 out of a possible 108 points for a course to be Quality Matters certified. Biology A/B scored 106 of 108 points. Algebra I A/B and English 9 A/B each scored 108 of 108 points.

iNACOL National Standards for Quality Online Courses

Plato Courseware is built to meet the most rigorous and comprehensive standards in online course content. The set of standards that is most well regarded and most instructive to understanding the Plato Courseware approach to online learning is the iNACOL National Standards for Quality Online Courses. These standards address course content, instructional design, technology, student assessment, and course management.

Table 3 lists the iNACOL National Standards for Quality Online Courses and illustrates how Plato Courseware's approach meets these standards.

Table 3: iNACOL Standards and Plato Courses

iNACOL Course Standard	Plato's Approach
Academic Content Standards and Assessments	
1 The goals and objectives clearly state what the participants will know or be able to do at the end of the course. The goals and objectives are measurable in multiple ways.	■ Each Plato course includes a Student Syllabus that clearly states the course goals and how they will be measured.
2 The course content and assignments are aligned with the state's content standards, Common Core curriculum, or other accepted content standards set for Advanced Placement® courses, technology, computer science, or other courses whose content is not included in the state standards.	■ Each Plato course includes a correlation document that aligns each lesson to the Common Core or state-specific standards.
3 The course content and assignments are of sufficient rigor, depth, and breadth to teach the standards being addressed.	■ Plato Teacher's Guides display exemplars and artifacts outlining clear alignment between objectives, assessments, instructional strategies, content, and technology.
4 Information literacy and communication skills are incorporated and taught as an integral part of the curriculum.	■ Content, activities, and assignments provide multiple learning opportunities to master each standard.
5 Multiple learning resources and materials to increase student success are available to students before the course begins.	■ Information literacy and communication skills are incorporated into Plato courses through discussion topics which can be used for online or in-class discussions. Suggested discussion rubrics are included in the Teacher's Guide and Student Syllabus.
	■ Materials to increase success are available to students before a Plato course begins, including an orientation tutorial, course syllabus, Learner Guide, and technical readiness information.
Course Overview and Introduction	
6 A clear, complete course overview and syllabus are included in the course.	■ A complete course overview and syllabus are available within each Plato course at any time for students to access.
7 Course requirements are consistent with course goals, are representative of the scope of the course, and are clearly stated.	■ Communication tools are provided within Plato Courseware. A Student and Family Toolkit is also available with step-by-step directions for communication.
8 Information is provided to students, parents, and mentors on how to communicate with the online instructor and course provider.	

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Legal and Acceptable Use Policies

9	The course reflects multicultural education, and the content is accurate, current, and free of bias or advertising.	■ All Plato curriculum development staff abide by curriculum design guidelines. These guidelines help ensure that content is accurate, current, and free of bias or advertising, including specific instructions regarding the following:
10	Expectations for academic integrity, use of copyrighted materials, plagiarism, and netiquette (Internet etiquette) regarding lesson activities, discussions, and email communications are clearly stated.	o Stereotypes based on culture, gender, religion, socioeconomic status, disabilities, or physical characteristics
11	Privacy policies are clearly stated.	o Illicit, risky, unhealthy, or mischievous behavior
		o Bullying, including ridicule, mean-spirited acts, violence, and aggression
		■ Edmentum recommends that students take unit and final exams in a proctored environment, controlled by the local schools, to prevent others from completing Plato course assessments on the student's behalf.
		■ Edmentum's Student Policy Guide clearly states privacy policies.

Instructor Resources

12	Online instructor resources and notes are included.	■ Online instructor resources for all Plato courses include:
13	Assessment and assignment answers and explanations are included.	o A Teacher's Guide
		o Access to general Assignment Keys and Rubrics
		o The ability to review all course assignments and assessments from within the teacher login

Teaching to Support Online Learning: The Plato Marzano Study

The evidence presented so far demonstrates the quality of Plato Courseware. However, Edmentum recognizes that courses do not function in isolation. Teachers play a pivotal role in facilitating student motivation and learning. In pursuit of providing the best learning experiences possible for all students, Edmentum is actively engaged in ongoing research to learn more about how learning happens in online settings.

In traditional classrooms, educators and students arrive with a certain set of expectations shaped largely by past experiences. Although students may need occasional reminders of what is required of them, this educational setting is familiar to both students and teachers. In addition, decades of research has explored classroom practices related to student achievement and identified instructional strategies that show positive, measurable effects on student achievement in a traditional classroom setting (Hattie, 1992; Marzano, 1998, 2003; Wenglinsky, 2000). Teacher-level variables associated with raising the academic achievement of students are commonly grouped into three categories: instruction, classroom management, and curriculum design (Marzano, 2000).

In contrast to the considerable research into instructional strategies used in a traditional classroom setting, there is a dearth of literature that examines the effect of instructional strategies on student academic outcomes in an online learning environment. While comprehensive standards for online teaching—such as the 2011 iNACOL National Standards for Quality Online Teaching—have been established, existing frameworks for online instruction are not based on research that has specifically addressed the effectiveness or impact of these guidelines on student achievement.

To address this void, Edmentum contracted with Marzano Research Laboratory, an education firm led by Dr. Robert Marzano that seeks "to continuously develop tools that translate high-quality education research into practical applications educators can put to use," to evaluate the relationship between student learning and effective teacher pedagogical practices with respect to the use of online instructional solutions. Using the Marzano Instructional Model (Marzano, 2007) as the framework, this study sought to identify effective instructional practices in the online learning environment. The full report, *A Study of Best Practices in Edmentum Online Solutions*, is available at www.edmentum.com. Results from the study are summarized below.

Summary of Results

The Marzano Observation Protocol is structured around ten instructional design dimensions representing three categories of teacher behavior, practices, and strategies that are commonly observed during instruction and that have been found to positively affect student achievement. Table 4 details instructional strategies and behaviors implemented by teachers in the study sample that were found to be significantly related to higher levels of student achievement in an online learning environment.

Table 4: Instructional Strategies Related to Student Achievement

Teacher practices positively impacting student achievement in the online environment

- persistent, active engagement in the online learning environment
  - o total time spent logged in to Plato
  - o number of times logged in to Plato
  - o average amount of time logged in to Plato

Marzano Dimension: Strategies involving routine events

- communicating course/assignment rules and procedures
- providing students with all materials needed to complete an assignment
- clearly presenting the goal/objective for each assignment
- offering encouragement and positive feedback to students
- allowing students to keep track of their learning progress
- accessibility to students via electronic communication as well as face to face

Marzano Dimension: Strategies enacted on the spot

- monitoring student work
- knowing all students by name and being able to recognize them outside of the online environment
- allowing students to progress through assignments at their own pace
- providing help to understand and practice new knowledge
- allowing students to ask questions during online course/assignment
- treating all students equally

Marzano Dimension: Strategies addressing content

- adding external resources to assignments aligned to local objectives

Analysis

In the past, the process of learning was often viewed as a largely passive experience in which knowledge is received and stored for future use. Over the past 20 years, however, cognitive research has led to theories and paradigms that reflect a more active model of knowledge acquisition. Similarly, one of the criticisms levied against online learning has been that when a teacher is removed from direct instruction, the role of educator is transformed into that of a passive observer. Results from this study provide resounding evidence to the contrary, as teacher engagement in the online learning process was found to have the strongest relationship to student achievement outcomes.

Figure 2 illustrates the relationship between student achievement as measured by end-of-semester (EOS) test scores and teacher engagement in Plato Courseware.

Figure 4: Student Achievement Related to Teacher Engagement

Interpretation

The study found that teacher engagement—as measured by the number of times teachers logged in to Plato and the amount of time spent in the system—was the strongest predictor of higher levels of student achievement. That is not to say that additional instructional strategies are not effective or necessary, but the teaching practices listed in Table 4 are best practices relative to affecting student learning. Simply stated, the more educators engage with Plato Courseware, the more students benefit.

Data-Driven Instruction

One of the key strategies supported by the Marzano study is data-driven instruction. It is clear that to improve student learning, teachers have to have data on student progress. However, information about students' academic progress and preparedness is of little use if educators lack the tools necessary to access and leverage the data at the school and classroom levels (McCann & Kabaker, 2013). Research demonstrates that data usage is a critical component of instructional planning in the most effective classrooms (James-Ward, Fisher, Frey, & Lapp, 2013). Teachers with a solid working knowledge of academic data can use that information to better understand their students' progress and tailor their instruction to help meet the needs of individual learners.

McCann and Kabaker (2013) evaluated two statewide efforts to increase data use by classroom teachers and found common themes that made the programs effective. First, few teachers have familiarity with data or the skills necessary to use data to inform instruction, so professional development sessions focused on building and maintaining data skills are necessary and important. Second, teachers greatly benefited from high-quality coaching from highly trained professionals who delivered skill-based training, instilling in teachers a strong internal working knowledge of data use and helping to build a "data-heavy" culture in schools. Finally, administrative support of data-focused efforts and allotting time during the workday for participation in training also factored into increasing data use among teachers.

Edmentum knows that leveraging student data is key to success, which is why it developed Sensei™. Sensei allows teachers to efficiently monitor and manage academic progress and achievement to make faster, more informed decisions. Sensei instantly creates intuitive charts, graphs, and visual cues to provide a real-time picture of progress for every individual student in a class. To ensure that teachers have the training they need to use this data-rich tool, Edmentum also provides customized, skills-based professional development delivered by highly trained professionals.

Bermudian Springs High School
York Springs, Pennsylvania

625 students
Grades 9–12

90% Caucasian
8% Hispanic
21% free/reduced lunch

Sharon Allison,
Online Learning Aide

Proven Results with Plato Courseware

Schools in Pennsylvania and across the country are seeing student success with Plato Courseware. The three case studies below represent the diversity of settings where Plato Courseware implementations have been successful.

Case Study: The Remedy for Keystone Exam Struggles in Pennsylvania

Preparation for Pennsylvania's high-stakes end-of-course exams and credit recovery take the forefront for a rural high school seeking to expand its options for struggling students who are at risk of becoming another sad statistic.

The Challenge

Bermudian Springs High School is a small, rural school located between Gettysburg and Harrisburg, Pennsylvania. Like most other schools, the combination of high-stakes testing and end-of-course graduation requirements has had an adverse effect on struggling students. When Pennsylvania implemented its Keystone Exams in 2012, students needed to pass these end-of-course assessments in algebra I, reading, and biology to graduate. Others found themselves short on credits because of family, work, or other complications.

Bermudian Springs' graduation rate was starting to drop toward 90 percent after several years of being over 95 percent. "We needed more students scoring proficient or better on their Keystone Exams and more students obtaining the credits they needed for graduation," explained Sharon Allison, online learning aide at Bermudian Springs. As in other settings, rural high school students need as many scheduling options and as much flexibility as possible to make these goals a reality.

How They Did It

Through a suite made up of Plato Courseware and Edmentum Assessments, (which includes Test Packs and Accucess), Bermudian Springs was able to offer students opportunities in remediation and preparation for the Keystone Exams, as well as the ability to make up missing credits, keeping the possibility of graduation in sight for students who might not have remained motivated otherwise.

"Students are guided through the system by me—a dedicated aide—as well as their response to intervention specialist and their classroom teachers," described Allison. All of the school's assets, including computer labs, classroom computers, and at-home availability, have been made available to the students. Students can work wherever they are and whenever they have the time, while keeping up with their existing schedules.

Using Accucess and Test Packs, students take a diagnostic test early in the school year to predict their success on the Keystone Exams. Concepts in need of wide-ranging remediation are shared with parents in review packets so they can help at home while students work with Plato Courseware.

Success

Early in the implementation seven students received missing credits they wouldn't have earned without the program. Students needing remediation toward success in the Keystone Exams have been successfully completing their Plato Courseware in algebra, biology, and literature. In just the fall semester of 2013, 189 students used Plato Courseware for a total of nearly 3,000 hours. The majority of students spent that time in math courses. "Most students are finding the programs engaging and have been excelling in their work because of it," reports Allison.

edmentum™

Figure 5: Total Hours by Subject at Bermudian Springs District, Sept. 2013–Jan. 2014

Subject	Total Hours
Math	1,575
Science	668
English	549
Other	21
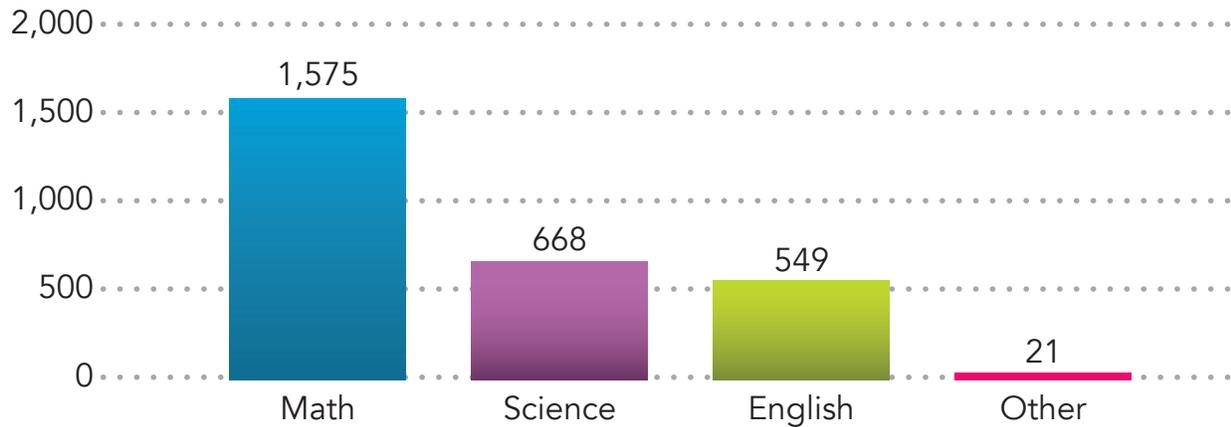
The Future

Between the state's mandates and the shift to the Common Core State Standards, these could be potentially challenging times for Bermudian Springs High School. But, as its Plato Courseware program grows and more students become aware of their options, the staff feels confident that the school will continue on its upward trajectory.

Bellevue School District
Bellevue, Iowa

364 students
Grades 6–12

96% White, non-Hispanic
23% eligible for free/reduced lunch

Tom Meyer,
Principal

Case Study: Plato Courseware Increases Student Success in a 1:1 Environment

Bellevue School District is a rural district in Iowa. Recently, the district has been working to improve students' Iowa state test scores. In 2012, the district launched its 1:1 program, which provided each student with a personal laptop computer. This program is helping Bellevue work toward a flipped learning model in which students watch and read new material at home and then spend time in school practicing what they learned with teachers.

Challenges

Bellevue wanted students to have access to extra assistance—available online and around the clock—to help improve basic skills. The district also needed benchmark measurements in place to know exactly where students stand and what they need to improve.

Edmentum Solutions

As part of a response to intervention program and to supplement regular coursework, students at Bellevue now access Plato Courseware on their laptops at home and study the material at their own pace. At school, students receive additional instruction and support from teachers.

Results

After using Edmentum products for one year, Bellevue saw lower failure rates in its middle school and high school classes for all quarters of the school year. Bellevue High School had a 100 percent graduation rate during the 2012–13 school year. Overall, 90 percent of students improved their scores on district benchmark tests from the beginning to the middle to the end of the year, and that growth paid off when students took the state exam at the end of the year. Scores in reading and math on the 8th and 11th grade tests improved across the board from 2012 to 2013.

Figure 6: Percentage of Students Proficient in Bellevue School District
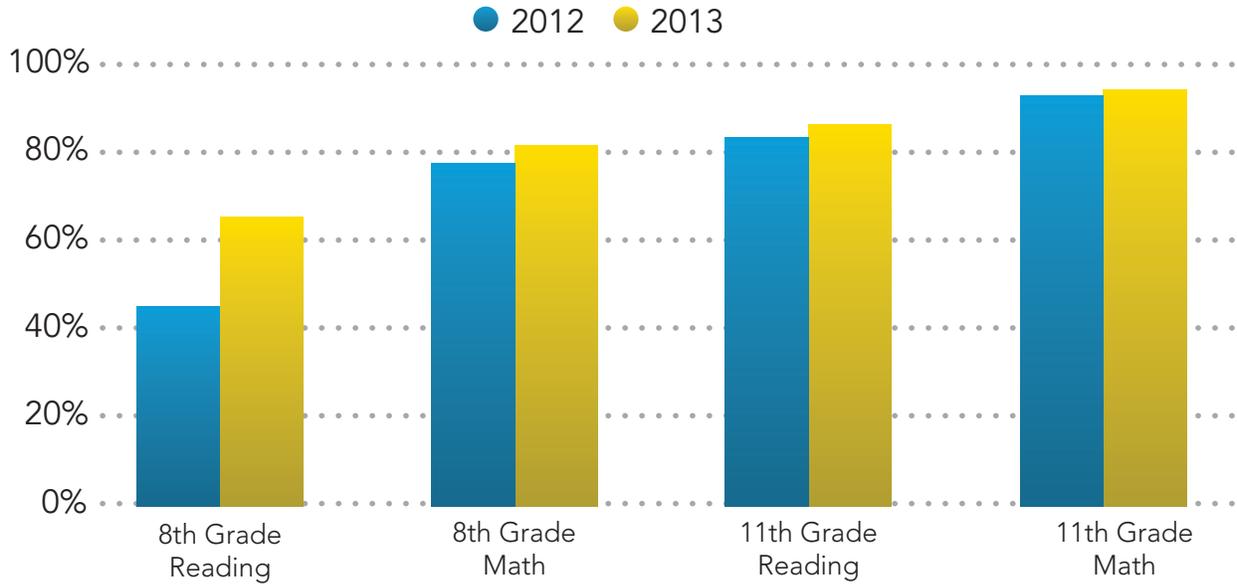
Teachers and students appreciate that they are now able to see the material before class using Plato Courseware. Students are more confident and prepared to achieve, especially in math courses. Principal Tom Meyer hears students saying, "I know this already. I did it in Plato!"

With Edmentum products, the district is able to offer a wide range of courses and better prepare students for high school, college, and beyond. Some students in 6th grade were able to take 9th and 10th grade math classes online this year. Advanced students are challenged, while struggling students are receiving the assistance they need to reach their grade level and beyond. Meyer said, "Make the time for [Edmentum products] in your schedule for students, and require it for students in need!"

East Chicago Central High School
East Chicago, Indiana

1,244 students
Grades 9–12

47% African American
51% Hispanic
92% eligible for free/reduced lunch

Lydia Jagger,
Current Principal

Case Study: A Blended Learning Program and Credit Recovery Solution

At East Chicago Central High School in East Chicago, Indiana, about 20 miles southeast of Chicago, the administration and staff are used to facing challenges and exceeding expectations. At East Chicago Central, 98 percent of the student population is African American or Hispanic, and 92 percent of students qualify for free or reduced-cost lunch. Social issues tend to affect the students scholastically, particularly in attendance: during the 2011–12 school year, 30 percent of students had more than 10 days of unexcused absences.

A Blended Learning Solution

East Chicago Central needed a solution that offered both English language arts and math support while also having differentiation abilities to help teachers identify knowledge gaps. East Chicago Central also wanted to establish a blended learning program for learners struggling on the Indiana End of Course Assessments (ECAs), a program where software would work hand in hand with in-person instruction. After some investigation, the school chose Plato Courseware, including the Secondary Academic Library, Beyond High School, Secondary Math, Test Packs, Accucess, and FlexTest. "We were looking for a solution that offered rigorous coursework for the students and a user-friendly interface for the teachers, all while being aligned to the Indiana State Standards," said then school principal Wendel McCollum.

East Chicago Central has also established a full-time blended learning program in which an English language arts teacher and a math teacher use Plato Courseware to help instruct students during six class periods per day. Learning is guided by the courses, particularly the Accucess module. The blended learning program supports students who need some extra help preparing for their ECAs. Other teachers throughout the school use Plato Courseware for everything from formative assessment and benchmarking to remediation and grade recovery.

A Credit Recovery Solution

Credit recovery is a major issue at East Chicago Central. Administrators were looking for a solution that could more efficiently help struggling students catch up with missing credits and help them graduate on time. "The credit recovery program allows students the opportunity to recover a credit that they did not earn while keeping them on track to graduate in four years," explained McCollum.

For students working on credit recovery, East Chicago Central has established a lab that is open the entire school day until 6:00 p.m., Monday through Thursday. Students are scheduled for the lab from one hour to multiple hours per day depending on their needs. They are also allowed to do their coursework outside of the lab, but tests must be completed during lab time. This flexibility allows East Chicago Central to address the changeable nature of its students' schedules and the various situations they find themselves in regarding missing credits.
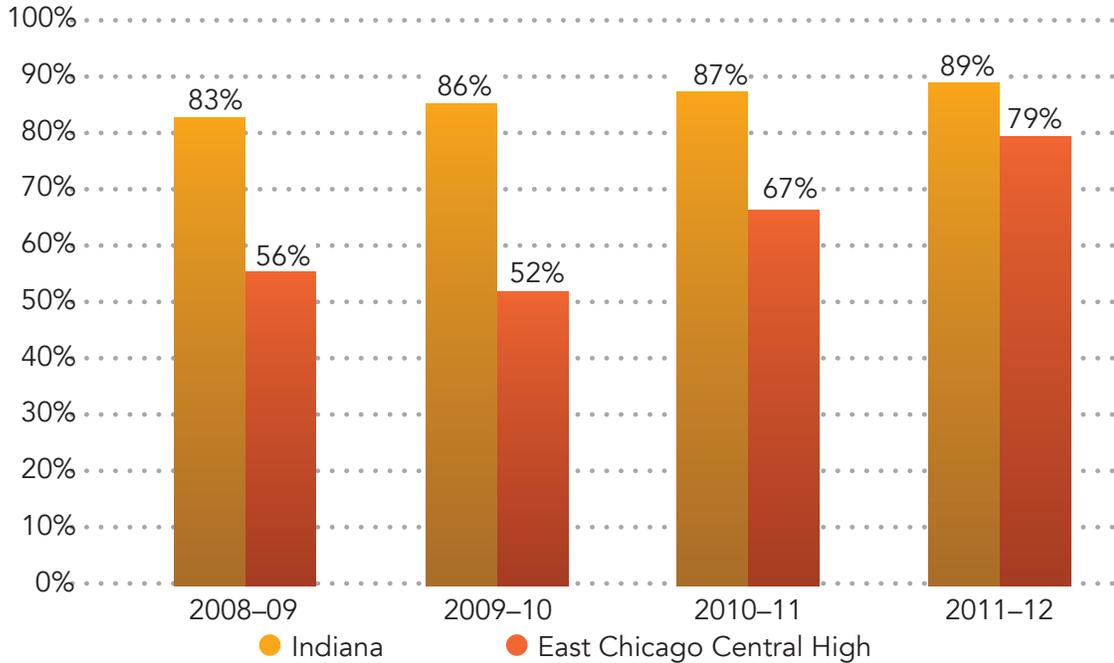
Success

The blended learning program helped 34 percent of students pass their algebra I ECA; 29 percent passed the English language arts ECA. Considering they were all students who had previously failed those assessments, that is a sizable gain. Those students are now on their way to graduating on time with their classmates.

The purpose of credit recovery is to help students graduate. With that as the measure, East Chicago Central is making waves by increasing its graduation rate from 67 percent to 79.3 percent in one year, considerably narrowing the graduation gap between East Chicago Central and the state as a whole. As of March 2013, the program has helped students recover 189 credits since its inception in January 2012.

McCollum said, "I remember a senior with attendance issues who was 10 credits behind. Through some diligent work on her part, including during lunch, she is now taking regular classes for her last semester and is on track to graduate with her peers. She complained at the beginning of the year about being so far behind, but thanks to the Plato program, she was able to accomplish her goals."

Figure 7: Graduation Rate Trend at East Chicago Central High School

Figure 7: Graduation Rate Trend at East Chicago Central High School

Legend:
● Indiana   ● East Chicago Central High

	2008–09	2009–10	2010–11	2011–12
Indiana	83%	86%	87%	89%
East Chicago Central High	56%	52%	67%	79%

Next Steps

It is full speed ahead for East Chicago Central High School's blended learning and credit recovery programs. The school believes Plato Courseware is a key piece in its new success, particularly in blended learning, but McCollum also credited his staff for the gains: "While the Plato software is important, one must not forget about using the Plato software in conjunction with a blended learning environment. Students need the affective component of having a teacher in the classroom that will offer one-on-one and small-group support in addition to the Plato software."

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