Transforming the Learning Process Through Engagement-Centered Technology
Research Shows Links Between Engagement and Improved Outcomes

Decades of research on undergraduate studies sustain the correlation of learner engagement with the best educational outcomes.\(^1\)

The factors that influence engagement are complex and unique to each learner. However, high-impact engagement practices typically involve at least one of three factors.\(^2\) Cengage Learning invests in and commissions independent studies that assess issues related to these factors, which include (a) significant time on purposeful task, and (b) engagement in higher order thinking: analysis, synthesis, evaluation, and application. Our studies also assess instructional efficiencies that support an increase in a third factor, (c) substantive interaction, including frequent feedback to students.

The studies help us to understand and to continually improve the engagement success of our resources. We share these studies in white papers that define the impact of our learning resources on today’s educators and learners (visit www.cengage.com/engagementcenter).

Our studies include students’ assessments of engagement levels with Cengage Learning resources, in contrast to courses that do not include
Cengage Learning resources. We also ask students to assess specific facets of engagement to better understand their consciousness of their own engagement.

We ask instructors to inform us of the value of Cengage Learning resources to improving their efficiency in preparing and producing their courses. These instructional efficiencies are important because they support instructors’ increased interaction with their students — important high-impact practice — by reducing the time they must spend preparing and administering the business pieces of a course.

We also work to collect evidence of student engagement, instructors’ effectiveness, and the grades that offer the measured outcome of high-impact engagement practices for instructors and learners.

**National Imperative Recognizes Technology’s Key Role in Learning**

Research has provided evidence of the engagement value of effective learning technology. The evidence is not only creating an imperative to apply technology to increase learner engagement — it is supporting the national agenda for including technology as the centerpiece for flexible learning systems.

The National Education Technology Plan 2010 (NETP), from the U.S. Department of Education’s Office of Educational Technology, defines a national imperative to bring “21st-century technology into learning in meaningful ways to engage, motivate, and inspire learners of all ages to achieve.” The plan was developed to address essential components of learning powered by technology: Learning, Assessment, Teaching, Infrastructure, and Productivity.

*Technology is at the core of virtually every aspect of our daily lives and work, and we must leverage it to provide engaging and powerful learning experiences and content, as well as resources and assessments that measure student achievement in more complete, authentic, and meaningful ways. Technology-based learning and assessment systems will be pivotal in improving student learning and generating data that can be used to continuously improve the education system at all levels.*

More recently, the 2013 National Survey of Student Engagement (NSSE) concluded that “both learning with technology and courses that improved students’ understanding and use of technology had a positive association with all four of NSSE’s academic challenge Engagement Indicators.” Technology’s value is in enabling flexible learning resources that better meet unique learner needs and improve instructional efficiencies — supporting all high-impact practices for engagement. Cengage Learning has published white papers to recommend best practices for applying technology to create the flexible learning resources that frame the improved engagement and outcomes cited by the NSSE.
Features of Engagement-Centered Technology

As Cengage Learning has considered what more we can do to advance the common interests of educational stakeholders, we have determined that contextualizing high-impact engagement in both learning resources and technology can help create greater understanding of the significance of their integration.

The new wave of fully integrated course solutions (some of which are described below) represents a paradigm shift and an opportunity to transform the learning process — to create a learner-centric experience that has been proven to improve learner outcomes and the level of engagement. Here is a list of what Cengage Learning looks for to optimize learning technology. It is recommended for all education stakeholders who review the latest generation of digital resources and each publisher’s vision for next-generation enhancements.

1. A streamlined, efficient reading experience and a cohesive, useful set of resources that is available to the student, on demand, in order to make the learning experience easier and more productive — glossaries, pronunciation guides, maps, charts, illustrations, and audio reading capabilities. The only interruptions to the reading experience should be those initiated by the learner.

2. Everything in one place, including helpful features and utilities, such as the ability to annotate and highlight text, access to library-quality resources, ability to customize teaching and student materials, and the ability to track student progress. Instructors and learners should not have to go to a different “place” to access additional capabilities.

3. An engaging, learner-centric approach that contributes to improved outcomes. Assessment and remediation features should have an integrated, clean, and modern interface that encourages learners to complete assignments, to utilize a self-paced format, and to obtain the right level of assistance — when and if needed.

4. Adherence to accessibility standards, including built-in audio capabilities, screen contrast and font adjustments, and other accommodations.

5. A fully customizable solution — one that enables instructors to add, delete, and re-order content to meet the unique needs of their students.

6. Integration with a wide variety of Learning Management Systems (LMS) to make it easier for instructors who teach at two or more institutions or departments to use the same publisher-provided materials across multiple LMS environments.

7. Platform independence to support the Bring Your Own Device (BYOD) initiatives that are in place, or in the planning stages, at many education institutions.
Results of Studies on Integrated Course Solutions

Aplia™ Promotes Similar Positive Results in Diverse Disciplines

Studies of Aplia™ used to teach Developmental English Reading and Writing courses and for Principles of Management courses evidence similar findings on the high-impact practices of engagement with grades as a measured outcome. Findings are similar, despite the distinct content and learning objectives.

Significant time on purposeful task

95% of instructors observed that coursework was engaging for students when they used Aplia to teach developmental English.

91% of students reported engagement with their studies of developmental English with Aplia.

70% of the students said they had learned more than they would have otherwise because of their use of Aplia.

85% of students of management principles noted Aplia helped them better prepare for tests, better track their course progress, and was valuable for learning new concepts.

Coursework Is Engaging When Using Aplia

![Coursework Is Engaging When Using Aplia](image)

<table>
<thead>
<tr>
<th></th>
<th>Instructors</th>
<th>Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course with Aplia was somewhat engaging</td>
<td>45%</td>
<td>36%</td>
</tr>
<tr>
<td>Course with Aplia was very engaging</td>
<td>50%</td>
<td>55%</td>
</tr>
</tbody>
</table>

N = 33 students and 35 instructors

Aplia™

Aplia significantly improves outcomes and elevates thinking by increasing student effort and engagement. Developed by teachers and used by more than 1,000,000 students, Aplia assignments connect concepts to the real world and focus on the unique course challenges facing students.

Study of Aplia for Developmental English

(www.cengage.com/whitepaper/aplia_devenglish)

A study by MarketingWorks and SEG Measurement on Aplia’s effectiveness in developmental reading and writing classes vs. a control group.

Study of Aplia for Principles of Management

(www.cengage.com/whitepaper/aplia_mgmt)

A survey of 73 principles of management instructors to assess the impact of Aplia on the engagement and learning of students as well as instructor satisfaction with Aplia.
Engagement in higher order thinking: analysis, synthesis, evaluation, application

90% of instructors believed Aplia assignments helped students better understand course content and apply the material to real world situations, in comparison to teaching management courses using textbooks only.

95% of instructors observed that coursework was engaging for students when they used Aplia to teach developmental English.

91% of students reported engagement with their studies of developmental English with Aplia.

90% of instructors believed that Aplia assignments helped to move students to higher-level learning, including critical thinking, analysis, synthesis, and decision making.

Student: Aplia Transforms Homework

Aplia helped me better prepare for tests. 85%
Using Aplia allowed me to better track my progress in this course. 85%
Aplia was valuable in helping me learn new concepts. 85%
Content in Aplia was relevant to me. 88%
The site was easy to navigate. 94%

Instructional efficiencies that support greater investments in substantive interaction, including frequent feedback to students.

84% of instructors noted improvements, including frequent feedback to students.

89% of instructors noted more tracking of students’ progress when they used Aplia for developmental English instruction.

Learn more at www.cengage.com/engagementcenter
Instructors: Aplia Enhances Teaching

- Aplia’s content worked well with my textbook in this course: 84%
- Aplia helped to improve my teaching of the course: 84%
- Aplia helped me track my students’ progress more: 89%

Measured Outcomes

100% of developmental English instructors felt that Aplia contributed to the improvement of student learning outcomes; 55% assessed outcomes as greatly improved.

71% of instructors of management principles courses cited student grades as the measure of improved learning.

Writing Skills Improve with Aplia

Scaled Writing Post-Test Scores (score range 100–700)

- Treatment: 234
- Control: 217

Reading Skills Improve with Aplia

Scaled Reading Post-Test Scores (score range 200–800)

- Treatment: 539
- Control: 523

Has Student Performance Improved in Your Course Since Using Aplia?

- 71% YES
- 29% NO
OWL (Online Web Learning) Improves Outcomes for Chemistry Students

LMS content integration is critical to the flexibility of digital learning resources. Cengage Learning’s OWL offers the LMS-agnostic qualities, open standards structure, and features of flexible technology recommended by Cengage Learning. A study conducted on OWL highlights its high-impact engagement value.

**Significant time on purposeful task**

61% of Chemistry I students and 62% of Organic Chemistry II students who used OWL spent more time studying course concepts.

51% of Chemistry I students and 48% of Organic Chemistry II students said they were more engaged in the course.

**The Student Perspective: Significant OWL Benefits**

<table>
<thead>
<tr>
<th>OWL Benefits</th>
<th>OWL Students in Chemistry I Courses (N = 170 students)</th>
<th>OWL Students in Organic Chemistry II Courses (N = 485 students)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Better understanding of course concepts</td>
<td>68%</td>
<td>61%</td>
</tr>
<tr>
<td>More likely to complete every homework assignment</td>
<td>67%</td>
<td>66%</td>
</tr>
<tr>
<td>Spent more time studying course concepts</td>
<td>62%</td>
<td>61%</td>
</tr>
<tr>
<td>Better understanding of difficult or abstract concepts</td>
<td>60%</td>
<td>53%</td>
</tr>
<tr>
<td>Better retention of course concepts</td>
<td>59%</td>
<td>53%</td>
</tr>
</tbody>
</table>

**Engagement in higher order thinking: analysis, synthesis, evaluation, application**

89% of Chemistry instructors noted that students gained a better understanding of course material through trial-and-error practice in OWL.

65% of instructors said that OWL helped students learn problem-solving and critical-thinking skills.

Learn more at www.cengage.com/engagementcenter
Transforming the Learning Process Through Engagement-Centered Technology

Instructional efficiencies that support greater investments in substantive interaction, including frequent feedback to students

Instructional efficiencies were improved for instructors who used OWL vs. those who did not have this learning resource.

Average Time Spent on Homework Preparation and Grading per Assignment

<table>
<thead>
<tr>
<th>Activity</th>
<th>Time to develop/plan each homework assignment</th>
<th>Time to grade/correct each homework assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>OWL Instructors (17)</td>
<td>19 minutes</td>
<td>58 minutes</td>
</tr>
<tr>
<td>Non-OWL Instructors (9)</td>
<td>34 minutes</td>
<td>58 minutes</td>
</tr>
</tbody>
</table>

Measured Outcomes

Organic Chemistry II students with access to OWL received an average homework grade of 91%, nine points higher than the grade for peers without access to OWL.

Given the difficulty of upper level chemistry courses, the percentage variance is highly significant — especially considering that the average homework grade in Organic Chemistry courses was 65%.

Study of OWL

Project Tomorrow, a national education nonprofit organization with research expertise in the use of emerging technologies within K-12, explored the instructor and student perspectives on the value of OWL as an instructional tool (26 instructors, 1,640 students in 14 states).
Customizable Content in CengageNOW Supports Engagement

Cengage Learning recommends a full-featured, publisher-provided content integration solution to ensure the ability to customize content. The solution should allow direct access to publisher content and the flexibility to tailor the content to meet specific course needs, including the ability to choose and re-order specific publisher-provided resources. Course customization interfaces that are Learning Tool Interoperability (LTI)-based provide the flexibility to re-order, add, and delete resources at the component or asset level. Look for a solution that operates seamlessly within the interface of the LMS.

CengageNOW offers customization/content integration. A study on this learning resource provides data that highlight the engagement value of both content and the open technical construction.

Significant time on purposeful task

Students in Classes Using CengageNOW are Engaged
(Student Reported Level of Engagement)

Instructors and students both reported deeper engagement through focused study and as measured in improved grades. Of particular significance are the student assessments of their engagement in terms of participation in their learning and their understanding of concepts.

97% of students found the coursework with CengageNOW engaging: 62% very engaging; 35% somewhat engaging.

73% of students said they were more engaged in the course because of their use of CengageNOW.

93% of students said that CengageNOW helped them to focus on areas where they needed the most help: 62% extremely well, 31% somewhat well.
Engagement in higher order thinking: analysis, synthesis, evaluation, application

100% of instructors reported that students’ engagement was positively impacted; 33% reported it was greatly impacted.

100% of instructors felt students were engaged in their studies: 53% were very engaged and 47% were somewhat engaged.

CengageNOW Helps Students Learn

Instructional efficiencies that support greater investments in substantive interaction, including frequent feedback to students

Once again we see the technical structure that supports instructional efficiencies, thereby offering instructors more time to focus on interaction with their students.

Measured Outcomes

81% of the 27 students reported they had learned more than they would have otherwise because of their use of CengageNOW.

Learners using CengageNOW achieved significantly higher grades: an increase from the 50th to the 64th percentile.

CengageNOW Users Achieve Higher Grades

(Student Grades, Scale = 0-100; N=246)

There was a 19-point percentile increase in grades of students taught by adjuncts/instructors with CengageNOW.
Enhanced WebAssign® Builds Student Confidence and Saves Instructors Time

In an online learning solution, integration between the LMS gradebook and assignable content has the potential to save instructors the greatest amount of time throughout the course. Look for the ability to assign specific activities — one at a time, all at once, or by topics and chapter — and to automatically pass grades for those assignments to the LMS gradebook.

Cengage Learning’s Enhanced WebAssign® (EWA) provides these features and delivers the same — or a similar — user experience across a wide variety of learning management systems. The ability to customize integrated solutions advances the high-impact engagement factors of this flexible learning solution.

Significant time on purposeful task

Students who used EWA for mathematics were more deeply engaged through the application of technology-based features (feedback, tutorials, and interactive eBooks) that helped to address their unique learning needs.

The majority of EWA students perceived greater engagement in their coursework.
EWA learners were also conscious of the difference the flexible learning structure offered them:

72% were more likely to complete every homework assignment.
69% felt more motivated to learn.
49% were more likely to attend class.
57% had greater interest in course materials.
50% felt that class time was more interesting and class discussions were better as a result of EWA.

**Engagement in higher order thinking: analysis, synthesis, evaluation, application**

Two-thirds of the EWA or treatment students (67%) said that because of using EWA they were more engaged in their course materials.
Instructional efficiencies that support greater investments in substantive interaction, including frequent feedback to students

100% of instructors said EWA was important to their professional productivity because it saved them time in course planning and grading assignments.

100% of instructors said EWA generated the highest value as a time saving tool in regards to grading assignments and course planning.

EWA demonstrated high instructional efficiencies for all instructors to support greater investments in substantive interaction. Instructors interviewed during the study also said students were less likely to come to office hours to get homework help since EWA provided remedial support.

Average Time Spent on Homework Preparation and Grading

- Time to develop/plan each homework assignment: EWA Instructors (11) - 26 minutes, Non-EWA Instructors (4) - 43 minutes
- Time to grade/correct each homework assignment: EWA Instructors (11) - 15 minutes, Non-EWA Instructors (4) - 46 minutes

“My goal is to have a higher percentage of my students complete the class, to have the class average raised, and to hear the students say they actually enjoyed using EWA to do their assignments, to have additional help (such as the videos), to communicate with me, and to have an accurate report of what their current grade is at any time.”

Maureen DuPont
Math Instructor, Palomar College

Learn more at www.cengage.com/engagementcenter
Measured Outcomes

Again we see improved grades as a measured outcome of high-impact engagement. We also and most importantly see an encouraging gain in confidence, which is an indicator of potential for improved engagement and learning — a giant step for those enrolled in developmental math courses.

60% of EWA students felt increased confidence in their abilities to be successful in math.

55% of EWA students felt decreased math anxiety.

Analysis of Final Course Grades for EWA and Non-EWA Students

“EWA ensures that students get instant feedback on whether they are solving problems correctly or not. It gives them the practice they need to be successful while saving the instructor the burden of hours of unnecessary grading work.”

Sam Davis
Math Instructor, Cal State East Bay
Next Generation Engagement

As Cengage Learning continues to study the engagement value of learning resources in use by millions of instructors and learners, we are also seeking to capitalize on the innovation afforded through analytics, human factors, and educational transformation powered by technology. Cengage Learning is leveraging institutional partnerships and state-of-the-art technical infrastructure and talent to lead a new wave of high-impact engagement learning resources.

MindTap

Cengage Learning’s MindTap allows instructors to personalize the teaching experience with relevant assignments that guide students to analyze, apply, and improve thinking, as well as measure skills and outcomes with ease. By allowing instructors to control what students see and when they see it – instructors can match a syllabus exactly. By hiding, rearranging, or adding your own content a unique learning path is created with relevant readings, multimedia, and activities that help move students up the learning taxonomy from basic knowledge and comprehension to analysis and application.

MindTap also uses powerful analytics and visual reports to drive outcomes. These visual snapshots of class progress, time on task, engagement, and completion rates inform instructors while also empowering students with information on where they stand at all times – both individually and compared to the highest performers in class. This insight helps students stay organized and focused on exactly what’s important while providing the built-in study tools, activities, assignments all in a single destination.

A limited initial study of MindTap offers a glimpse into its potential to boost learner engagement while helping instructors focus on what’s most important to them.

“MindTap’s greatest strengths are the progress tracking and the ability to add [your own] materials that are gradable.”

Stephen Brusnighan
Kent State University
MindTap is a cloud-based solution designed to help students stay organized and efficient with a library of learning apps called MindApps. MindApps are accessible via the MindApp dock and include frequently used apps such as:

- Text-to-speech
- Dictionary
- Web video
- Social media integration
- Assignments
- Flashcards
- Live tutoring
- Library integration
- Local content

MindTap is a Powerful Learning Tool

- 100% of MindTap students agreed the MindTap environment was easy to navigate.
- 88% of MindTap students agreed that MindTap helped them complete assignments on time.
- 88% of MindTap students agreed that the MindTap content was relevant to them.
- 7 out of 8 MindTap students would recommend MindTap to their friends.

Students agree — MindTap content is relevant to their course.

“I'm convinced that the higher course ratings and grades were, in large part, a result of students' engagement. It was an unmitigated success.”

Robert Black
SUNY Maritime College

N = 8 students
Each MindTap learning path includes a set of activities, which can include readings, homework, local content, or multimedia resources. The basic framework consists of a set of learning paths, the sequence of which is personalized by the instructor. Instructors may also add their own content, such as PowerPoint® presentations, videos, and audio clips using Google Docs and other apps within MindTap. To foster student engagement, MindTap includes functionality for students to take notes, highlight parts of the text, and create audio readings of the text to cater to specific learning needs.

MindTap is presently available to deliver over 200 courses.

**Learning Management System Integration**

Our ability to integrate MindTap into your learning management system ensures that instructors do not have to choose textbooks and related content based upon their compatibility with the LMS that the institution or department is currently using. MindTap offers a better model, based on partnerships with a wide range of LMS vendors for deep content-to-LMS integration. No new passwords are necessary – students and instructors log in through the school’s LMS portal. Instructors can control what students see in the LMS by creating links to specific MindTap course content. These features work in conjunction with any LMS that supports the IMS Basic LTI open standard.

Advanced features, such as automatic gradebook exchange and a drag-and-drop interface that makes it possible to customize courses more quickly and easily, are the result of the innovations and co-development efforts of Cengage Learning and its LMS partners to leverage and extend the LTI standard. The seamless drag-and-drop environment of a MindTap-to-LMS integration makes it possible for instructors to make rapid course design changes, helping students focus on what’s important.

“Almost across the board, students using MindTap improved on the main learning objectives of the class... I’ve never seen any results like this.”

Carey Roberts
Arkansas Technology University

Learn more at www.cengage.com/engagementcenter
Recommendations

In 2013, the NETP Technical Group recommended policy to improve the research that will support optimum outcomes of effective educational technology. The Department of Education has asked all education stakeholders to share information and data as the best strategy for creating confidence or as a basis for exploration of other alternatives for the use of educational technologies. The NETP calls for “partnerships to break down domain silos and create connections between researchers, the commercial sector, and educators.”

This paper responds to the goal for establishing such partnerships across all commercial and educational sectors. We will continue to invest ourselves in professional organizations that are advancing the best practices for technology in education. We will also continue to share our studies on the high-impact practices for engagement that we assess through our studies of Cengage Learning resources.

Most importantly, we seek discussion that will help us learn from others and share more about how, together, we can meet and exceed expectations for educational program success that are advanced through high-impact practices of engagement.

ENDNOTES

i  The premise is deceptively simple, perhaps self-evident: The more students study or practice a subject, the more they tend to learn about it. Likewise, the more students practice and get feedback on their writing, analyzing, or problem solving, the more adept they should become (Kuh, 2003). The very act of being engaged also adds to the foundation of skills and dispositions that is essential to live a productive and satisfying life after college. That is, students who are involved in educationally productive activities in college are developing habits of the mind and heart that enlarge their capacity for continuous learning and personal development. (Karini, Kuh and Klein)


Cengage Learning is a leading provider of innovative teaching, learning, and research solutions for academic, professional, and library markets worldwide. The company's products and services are designed to foster academic excellence and professional development, increase engagement, improve learning outcomes, and deliver authoritative information to people whenever and wherever they need it. Through the company's unique position within both the library and academic markets, Cengage Learning is providing integrated learning solutions that bridge from the library to the classroom.  www.cengage.com

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