Helping Struggling Students Get on the Path to Success
Identifying Struggling Students

Among first-time, full-time students who started working toward a bachelor’s degree at a four-year institution in 2016, only 41% will graduate by 2020, with 59% taking, on average, six years to earn a degree.¹

Now more than ever, it’s critical to identify at-risk students at the beginning of a new semester—and early on in their college experience—to prevent them from getting off track or dropping out. We want these students to stay the course, declare majors, and graduate on time. But first, instructors need to identify who these students are so they can provide support.

At-risk students are more likely than average students to withdraw from the college or university. Instructors use a variety of metrics to identify students who are struggling or at risk of dropping their class. From the start of the semester, instructors can track attendance and grades and refer those students with a low predicted GPA to meet with academic counselors and their college academic advisor.²

Attendance and class participation are good markers for identifying those students who are at risk of falling behind. “Students who become at risk are those who never attend class,” according to Pam Graybeal, adjunct professor at University of Central Florida. She says, “They are permitted one ‘do-over’ if they wish to major in accounting, and that sometimes gets their attention.”

Assessments and assignments early in the semester give instructors a chance to intervene and spend more time on more difficult topics or the concepts that need further explanation. “I find that any early assignments—quizzes, online, homework—show me within the first one to two weeks of the course the students who are most likely to struggle,” explains Andrew Karatjas, associate professor at Johnson and Wales University.

In addition to grades and attendance, there are other ways to identify at-risk students. The time students spend within the courseware and how many practice activities they are completing is indicative of students who will improve their grades over time. If students neglect these activities, especially in the early stages of the course, then they could be at risk.

Studies show that students who engage with adaptive practice on a regular basis get better grades in their courses.³

When it comes to identifying at-risk students early in the term, instructors using Adaptive Practice within WileyPLUS gain insight into class proficiency and individual student performance to quickly identify those who may be struggling. Instructors in our survey also employ Productivity Reports, Performance Reports, the Student Activity Dashboard, and Proficiency Metrics in WileyPLUS to gauge student comprehension and check their performance throughout the semester.⁴
Instructors who assign pre-work in the adaptive practice module motivate students to review the material before lectures so that they come to class better prepared. With this preparedness, students feel more confident to participate in group discussions. Students can also quickly identify areas in which they need to improve—and perhaps even self-identify themselves as at risk. “Students want and need instantaneous feedback and that’s just what they get with the adaptive practice questions,” says Leslie Van Wolvelear from Oakton Community College.

The practice questions give struggling students extra time to focus on areas in which they need the most help. “It’s a great way to enhance your learning beyond just reading the textbook. There are so many practice questions and ways to practice that when used properly, can help make the difference between a mediocre and great final mark,” said Sheliza Popatiya, student at Mount Royal University, Bissett School of Business.

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**Early Detection of At-Risk Students**

- Low attendance in face-to-face courses
- Poor responsiveness within online communications
- Low engagement with practice activities available in the course
Assisting Struggling Students

According to Bloom’s taxonomy, the more time students spend on activities and adaptive practice, the greater the opportunity for concept mastery. When instructors make Adaptive Practice in WileyPLUS a percentage of the student’s final grade, they are not only tackling the challenge of the “disengaged student,” but encouraging him or her to work within the learning platform on a regular basis.

The more students engage in “active learning,” the more they retain. In fact, 58% of the students we surveyed found adaptive practice helpful or very helpful in practicing the material. And 64% of them engaged more fully in the course. This consistent, organized practice tailored to their strengths and weaknesses helps students develop a better understanding of course concepts, resulting in better student outcomes.

Students who earned 100% of the available WileyPLUS points achieved a course grade that was about 1.5 grades higher than those who did not earn any points.

Adaptive Practice in WileyPLUS

At Oakton Community College, accounting professor Leslie Van Wolvelear was faced with lack of student motivation in her online courses. To improve student engagement, Leslie volunteered to pilot Paul Kimmel’s Introduction to Financial Accounting with WileyPLUS in her classroom. Leslie implemented adaptive practice questions and even offered extra credit to students who scored 70% or higher on the practice questions. This strategy helped make study time more focused and effective, and the instant feedback helped to improve student confidence and motivation.

Leslie was also able to be selective about which course material was available to students throughout the term. This simplified student view proved to be less overwhelming and helped students focus on the content and resources that were most important each week. After using WileyPLUS, average final grades for students who used adaptive practice increased to a score of 90%. Attrition rates improved as well and went from 39% in Fall 2017 to 27% in Fall 2018.
Early Assessment and Open Communication

Early assessments help struggling students stay on track and open the lines of communication between an instructor and his or her students. Roxanne Phillips, accounting program chair and faculty member at Colorado Community Colleges Online, says, “I give homework assignments due the first week of class. I can see who is missing, who struggled with an assignment, and who is a superstar by the beginning of the second week.”

“I reach out to students via email and ask them to tell me how they feel they are doing in class, what (if anything) is giving them trouble, and what they think they could do to be successful in the class,” she explains. Communication and clearly defined expectations are often the difference between students dropping or completing a course.

Peer-to-Peer Learning

Peer-led learning and tutoring has been shown to help students bridge knowledge gaps. In a 10-year pilot program started in 2001, The University of Texas at El Paso replaced one hour of lecture in a large STEM course (with more than 300 students) with several small two-hour, peer-led team learning workshops taught by trained undergraduate students who had previously excelled in the course. A 10-year study of this pilot (2001–2011) showed that this program produced a greater than 15% increase in the weighted average of the passing rate.6

“We require students to submit group assignments. Although we haven't collected data, it seems like the groups who work together tend to get higher scores on the assignment and overall in the class,” says Ella Burnham, statistics instructor at the University of Nebraska – Lincoln. Whether weaker students are paired with high performers or the student groups are chosen at random, the instructors we surveyed have found that when students miss a peer learning session, it sets them back more than missing a traditional lecture.

Digital Access

Being prepared on the first day of class is an imperative step in student success. But having affordable course materials is challenging without a digital option that provides a level of equity on day one—giving all students the confidence they need for a strong start.

Digital materials allow peers to collaborate with one another and eliminate the anxiety or fear of approaching a teacher, especially in a large lecture setting. In the eTextbook, instructors and students have many options for
Due to a lack of funds, 72% of students said they waited to purchase course materials until after courses began—and 27% didn’t buy them at all. But if students come to class unprepared and without the required materials, how can they keep up as the course progresses?

“‘This is going to be something that students of the future expect,’” says David D. Kent, director of the VolShop, the campus store at the University of Tennessee, Knoxville. “‘At the end of the day, if students can have their material delivered to them when they need it and where they need it from one platform, then we’ve met our goal.’”

As a digital solution, a growing number of colleges and universities nationwide are offering Inclusive Access programs so students have access to affordable, online textbooks on or before the first day of class. Inclusive Access delivers highly interactive course materials like the eTextbook and provides students with a cost-savings ranging from 20 to 69% lower than the price of a printed book.

The Importance of “Doing” vs. “Reading”

Recent Research

Carnegie Mellon University: The Doer Effect

In recent years, research at Carnegie Mellon University (CMU) has investigated the relationship between the different ways students can study and the learning outcomes that result. Two significant findings from that work are:

1. The effect on outcomes of doing interactive practice activities is about six times greater than that of reading the text.

2. The effect of doing such activities is causal, not merely correlational. That is, doing more practice yields better outcomes.
This relationship between practice activities and learning outcomes is called the “doer effect.” It has been replicated across several different subject domains in research by CMU and Acrobatiq by VitalSource. Since the “doer effect” is causal, this supports an evidence-based recommendation for struggling students to spend more time engaging with practice activities. However, according to engagement data, many struggling students are more inclined to spend more time reading the text rather than practicing.

**New Partner Research: Instructure, VitalSource, Wiley**

**Approach**

Our study was conducted from January through June of 2019 and included 1,003 students from nine different institutions in the dataset. The research combined student data on time spent reading the course textbook and time spent doing assigned course activities. These were used as measures of “reading” and “doing” in the sense of the prior research studies at CMU. The target outcome was set as the student’s final combined score on course activities.

Before conducting a regression analysis, we can get an idea of the relationship between the outcome and the amount of student “reading” and “doing,” respectively, by grouping students by quartiles (e.g. bottom 25% of reading done, etc.) and looking at the mean scores in those quartiles:

<table>
<thead>
<tr>
<th>Reading: Mean score by reading quartile</th>
<th>Doing: Mean score by doing quartile</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 82.489841</td>
<td>1 77.653068</td>
</tr>
<tr>
<td>2 81.468645</td>
<td>2 82.663904</td>
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<td>3 82.449240</td>
</tr>
<tr>
<td>4 81.807171</td>
<td>4 85.283506</td>
</tr>
</tbody>
</table>

These mean scores show an upward trend in score with increased “doing,” but this trend was not observed with increased “reading.”
This study combines data from multiple courses, each with its own set of assigned activities and level of difficulty. This graph illustrates these differences by showing the mean student score by institution.

To control for these course differences, a linear mixed effects regression with a random intercept per course was used. This gives a clearer picture of the relationship between the scores and the amount of reading and doing, treated as the fixed effects.

The results of the regression are presented in the footnotes. The reading, doing, and score variables were normalized before the regression, as is the usual practice, so that the coefficients can be compared.

Results

The amount of “doing” is statistically significant (p << 0.001) and the amount of “reading” is not (p = 0.7466). Although the types of data available in our partner study restrict an analysis that can establish a causal link between “doing” and overall student outcome, our analysis does indicate a significant correlational relationship between practice and better scores.

In conclusion, given the context of research that shows engaging in practice activities does improve scores, we can conclude that this approach does improve overall student outcomes. This is evidence for recommending that struggling students engage in more practice.

SUMMARY

Based on our research and studies, here are the top recommendations for assisting and rescuing at-risk students before their grades or attendance begin to diminish:

Best Practices for Helping At-Risk Students

- Assigned practice through available course materials both in and outside of the classroom
- Adaptive learning tools available through the course platform
- Discussion and group assignments so students can improve through peer learning
- Instructor outreach to students both in and outside the classroom
- Analysis of data (via Canvas or VitalSource Bookshelf) to determine a student's percentage of usage
- Tapping into the collective knowledge of the class
- Student surveys to gauge early comprehension and engagement with challenging material
- Student Partner program to assist with first-day-of-class registration and questions in the learning platform
- First-day-of-class and affordable access to course materials such as an Inclusive Access program
Footnotes and Sources


5 Oakton Community College Case Study. WileyPLUS, 2018.


```
# R
lme.model <- lmer( z_score ~ z_reading + z_doing + (1|course_id), data=df )
summary( lme.model )
```

Linear mixed model fit by REML ['lmerMod']
Formula: z_score ~ z_reading + z_doing + (1 | course_id)

Data: df

REML criterion at convergence: 2750.6

Scaled residuals:
 Min 1Q Median 3Q Max
 -6.6654 -0.4165 0.1702 0.6210 2.2914

Random effects:
Groups Name Variance Std.Dev.
course_id (Intercept) 0.1583 0.3979 Residual 0.8552 0.9248
Number of obs: 1003, groups: course_id, 28

Fixed effects:

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About the Wiley, VitalSource, Instructure Partnership

As strategic partners in developing and delivering educational content and platforms to the world, we are driven to research, learn, and understand the needs of our customers. When discussing possible research topics, we realized that, as individual entities, we had all spoken to instructors striving to identify and help at-risk students. This demographic can quickly lead to failing grades and increased attrition rates, which is something all students, instructors and institutions try to avoid. We also realized that these same instructors face ever-increasing workloads that may hinder their ability to easily resolve these mounting issues.

As partners, we decided to investigate the best methods for identifying and assisting at-risk students. We knew this information could help instructors as well as the students that we support. We hope this research assists you in your own endeavors.

Deeper Dive into Practice

Given the established correlation discovered in our research between practice and higher scores, we wanted to explore this deeper with one of our sample institutions, Lorain County Community College (LCCC). In the following case study, Kati Dobeck, a professor at LCCC, analyzes her Spring 2019 Introduction to Statics course as it relates to identifying her at-risk students and the methods she implemented to improve their scores.
Lorain County Community College Case Study

THE CHALLENGE:
Meeting Diverse Student Needs Using Adaptive Practice

Lorain County Community College (LCCC) is a public community college in the city of Elyria in Lorain County, Ohio, with learning centers in Wellington, North Ridgeville, and Lorain. In 2018, Lorain County Community College was recognized by the American Association of Community Colleges as "FIRST IN THE NATION FOR STUDENT SUCCESS."

Kati faces a wide range of aptitude and socioeconomic needs within a single classroom, making it a challenge to meet everyone’s needs for success.
The LCCC has a diverse student population, especially with regards to preparedness and aptitude. The student body is comprised of:

- 32% over the age of 24
- 27% high school students
- 52% first generation college students
- 10% that identify as Hispanic
- 10% that identify as Black or African American
- 3% that identify as two or more races

PRIOR TO FALL 2016:
The prerequisite for Introduction to Statistics was Intermediate Algebra, where students were taught the skills they needed for her statistics course. This level of preparedness combined with Kati’s diverse teaching methods resulted in an 85% success rate in her on-campus course and a 65% success rate in her online course—a strong achievement for a community college statistics course.

FALL 2016:
The pre-requisite was changed to Foundations of Quantitative Reasoning, a developmental course with a placement level equivalent to Basic Algebra. This streamlined students’ course loads and reduced the time required to graduate. However, Kati immediately noticed a negative effect in her classroom: students were coming to class unprepared and there was nothing to help them synthesize the material they needed to learn. Their attendance started failing, and as a result, Kati’s course success rate dropped to 72% in her on-campus course and 60% in her online course.

With student success rates dropping across all sections, Kati and the LCCC Math Department needed to quickly identify and assist students who were struggling due to their lack of preparedness. While some students coming from more affluent high schools were more prepared, most students held a rudimentary understanding of math. Kati faced the challenge of addressing individual needs among a diverse level of preparedness; she needed a tool that could combat low aptitude levels while engaging higher aptitude students.
THE STRATEGY:

FALL 2017 and SPRING 2018:
The next academic year, Kati started offering Adaptive Practice within WileyPLUS. This was a solution for students who needed more practice to synthesize challenging concepts and to enhance comprehension. Kati also knew that her more prepared students would gain valuable practice since adaptive questions would present more challenging questions to high-performing responders.

When setting up her assignments, Kati weighted adaptive practice at 5% of the final grade, while setting the proficiency threshold at 80% for full-credit (a grade of 100%).

Her students began the exercises, but their productivity and engagement stalled once they were faced with the challenge of obtaining 80% proficiency. Students were also less motivated to put forth the effort since they could still earn an A in the course without completing the adaptive practice work. This was evident from the average adaptive practice grade of 62.8%. However, Kati and some of her students quickly discovered that adaptive practice scores were the best predictor of how students would perform on their cumulative final exam.

Spring 2019:
Kati started using the new WileyPLUS, which is fully emerged with the Canvas LMS. She kept her original set up with the three high-stake exams, but given the positive results with adaptive practice, she decided to emphasize the tool to improve student engagement.

Adaptive Practice assignments are now called “quizzes” in her class and are weighted as 12% of the final grade. She altered the proficiency threshold so that 70% is full credit (a grade of 100%), and a proficiency of 60% equals a 90% grade, giving students more opportunity to succeed.
THE RESULTS FROM SPRING 2019:

**POSITIVE STUDENT ATTITUDE:**
Kati has learned that setting the right weight and proficiency level has made all the difference when it comes to her class's attitude toward adaptive practice:

“They aren’t complaining about the homework, and they’re actually completing the WileyPLUS tasks.”

**STRONG EXAM PREDICTOR:**
Kati also discovered that, with her new implementation setup, student adaptive scores were higher (with $\bar{x} = 76.9\%$) and an even stronger predictor of their performance on exams (with $r = 0.65$). Since tests are still high-stakes in her course, this is extremely valuable information for her and her students.

In the Spring 2019 regression model, which uses adaptive practice averages to predict final exam scores, the slope is 0.56. **This means that for every 1 percentage point increase in the adaptive practice average, we predict that the final exam score will increase by 0.56 percentage points.**

**IMPROVED COURSE GPA:**
When considering all students enrolled in Kati’s courses (including those that withdrew from the course), Kati saw a 0.14 point increase in course GPA with the implementation of adaptive practice. For students that completed her course, Kati saw a 0.23 point increase in course GPA.

**IMPROVED FINAL EXAM SCORES:**
Finally, and most fortunately, Kati saw a 5.4% point increase in her students’ median final exam scores.

<table>
<thead>
<tr>
<th></th>
<th>Course GPA: All Enrolled Students</th>
<th>Course GPA: Students that Completed the Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring 2017: No Adaptive Practice</td>
<td>1.68</td>
<td>2.06</td>
</tr>
<tr>
<td>Spring 2019: With Adaptive Practice</td>
<td>1.82</td>
<td>2.29</td>
</tr>
<tr>
<td>Difference</td>
<td>0.14</td>
<td>0.23</td>
</tr>
</tbody>
</table>

**LOOKING AHEAD:**

**FALL 2019:**
The LCCC math department will offer over 40 sections of statistics classes, and they have decided to implement a co-requisite model to remediation, which has shown promising results at other colleges. This model involves putting almost all students, regardless of their placement score, directly into the college-level statistics course and enrolling them in a co-requisite support course for just-in-time remediation.

This new co-requisite version of statistics will be implemented in Fall 2019, which will result in a larger and more diverse cohort of students taking the course. They will be implementing Kati’s approach with WileyPLUS and Adaptive Practice to ensure all students have the opportunity to succeed!