



Pearson

MyLab Foundational Skills

Efficacy Research Report

April 3 2018



Contents

- 03 Introduction
- 05 Findings in brief
- 06 Product design and development
- 08 Intended product implementation
- 09 Product research
- 17 Appendix
- 19 PwC assurance report

The corpus of research for this product includes research conducted by our in-house researchers in partnership with customers, and research conducted by third party researchers. All research included in this report meets the standards we have set out for our own efficacy research. These are informed by and aligned with guidance on educational research quality provided by organisations such as the American Educational Research Association and the What Works Clearinghouse.

Efficacy statements in this report are subject to independent assurance by PricewaterhouseCoopers LLP (PwC). The PwC assurance report is on page 19 and further details can be found in the [Pearson Efficacy Reporting Framework dated April 3 2018](#).

Introduction

In 2013, Pearson made a commitment to efficacy: to identify the outcomes that matter most to students and educators, and to have a greater impact on improving them. Our aspiration is to put learners at the heart of the Pearson strategy; our goal, to help more learners, learn more. Part of our commitment was to publish research regarding the impact of the use of our products on outcomes, and to have the outcomes subject to independent audit. We call this efficacy reporting. There is no rulebook for how to do this, no model to follow. We've had to learn fast during this journey, we've sought guidance from others including external expertise, and we are now some, but not yet all of the way there.

The road taken and the milestone reached

In a first for the education sector, we have published audited efficacy reports on some of our most widely used products. Together, these products represent 18 million learners. This Research Report includes independently audited efficacy statements that have been prepared using the [Pearson Efficacy Reporting Framework dated April 3 2018](#) — which we have used consistently for the Pearson products we are reporting on.

We have sought to use the efficacy reporting process to amplify existing non-Pearson peer reviewed research about our products. We've also sought to foster innovation in efficacy research by conducting new research and placing value on a range of research methods — including implementation studies, correlational and causal designs — ensuring data is collected, analyzed and presented to agreed standards at the appropriate stages in each product's lifecycle. The research conducted for this report, and the efficacy statements produced as a result, are designed based on international best practices such as those set out by the American Education Research Association and the What Works Clearinghouse. We have synthesized these into a set of standards we hold ourselves accountable for in our research and reporting. These are set out in the [Pearson Efficacy Reporting Framework dated April 3 2018](#).

Furthermore, we adhere to the same peer-review processes as other high quality research in the education sector. Our work was independently reviewed and validated by SRI International, a well-known non-profit research center, and shared for discussion at research conferences organized by, among others, the American Education Research Association.

Our body of research contains evidence of statistically significant relationships between the use of our products and learner outcomes like student achievement. We want to be clear, though, that efficacy is not a quality a digital product can possess in and of itself. We recognize that implementation — the way a product is integrated into teaching and learning — also has a significant impact on the outcomes that can be achieved. Our reports do not yet capture the full range of intended product outcomes, nor the variety of different ways of implementing our products. What we do know is that the more we can engage with our customers about best practices that can support the integration of learning technologies into their teaching, the more likely they will be to achieve their desired outcomes.

We have commissioned PricewaterhouseCoopers LLP ('PwC') to audit the efficacy statements set out in our Research Reports. This is to demonstrate that the statements accurately reflect the research that has been carried out. PwC's audit report can be found at the end of this document.

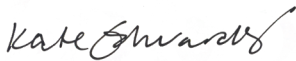
The journey ahead

Delivering on our reporting commitment has never been our ultimate goal; what matters most to us is helping more learners, learn more. Our aspiration is to explore what works, for whom, and why; and to encourage discussion about questions such as: What outcomes matter most to students? What should teaching and learning look like? What evidence should we apply to its design? And how should we evaluate impact?

We are excited to continue partnering with educators and others in the field in order to better understand how interactions between educators, students and learning technology can enhance outcomes. We have also been energized to see others in the education sector begin to focus on efficacy and research — though we recognize that their application in education is still nascent. In order to accelerate the emergence of its full potential we are already developing new ways of partnering with educators, researchers and institutions so we can advance this work together. In doing so, we will continue to advocate for the need to apply rigorous evidence to improve the outcomes of teaching and learning, while also seeking to ensure that evidence captures customers' experiences and is relevant and useful to educators in their practice.

Special thanks

We want to thank all the educators, students, research institutions and organizations we have collaborated with to date. We are spurred on by the growing number of opportunities for us to learn from others in the sector who are beginning to tackle the same challenges. If you are interested in partnering with us on future efficacy research, have feedback or suggestions for how we can improve, or want to discuss your approach to using or researching our products, we would love to hear from you at efficacy@pearson.com. If we, as a sector, tackle this together, we will help more learners learn more.



Kate Edwards

Senior Vice President,
Efficacy and Research, Pearson
April 3 2018

Findings in brief

Pearson sought to explore whether the use of MyLab Foundational Skills, a mastery and competency-based online platform designed to assess and remediate a selection of skills to prepare students for college and careers, is related to students' course grades.

This Research Report presents findings from two research studies: one comparative study conducted at a community college in the state of Arizona, with students enrolled in Adult Basic Education courses; and one correlational study conducted at Rio Salado College. Our aim in using mainly correlational study designs was to seek out possible relationships between the use of MyLab Foundational Skills and students' course grades to identify areas of focus for potential future research using more rigorous causal study designs.

The findings appear alongside details of the research studies, including descriptions of the samples studied, methods of analysis, results, limitations and generalizability, and notes on possible future research.

The report also summarizes the context surrounding the findings, including the research that informed the design and development of the product, the history of the product in the market, how educators use the product, and its intended outcomes.

The findings are inseparable from their surrounding context and the design of the study that produced them. To learn more about these elements, follow the links to our Technical Reports in the **Research studies** section.

In the context of the study conducted at a community college in Arizona, when controlling for pre-test scores, age, and gender, Pearson found that:

- There were no significant differences in reading, math, and language scores between students who used MyLab Foundational Skills and students who did not use MyLab Foundational Skills, when adjusting for pre-test scores, age, and gender.
- There were no significant relationships between average number of hours spent per day in MyLab Foundational Skills and scores on reading, math, and language tests.

In the context of the study conducted at Rio Salado college, after controlling for selected student background characteristics, Pearson found that:

- Each additional learning objective mastered was associated with a 3% increase in the odds of passing the course.
- Each additional homework attempt was associated with a 6% increase in the odds of passing the course.
- Each additional attempt at mastering a learning objective was associated with a reduction in a student's odds of passing a course of 3%.
- Making 10 additional homework attempts was associated with an increase in a student's final course grade of 0.11 grade point.
- Mastering 10 additional learning objectives was associated with an increase of 0.13 grade point.
- Making 10 additional learning objective attempts was associated with a decrease in final course grade of 0.10 points.

The complete statements are set out in the boxes titled "Efficacy statements" on pages 11 and 15. These statements have been subject to assurance by PwC, whose report can be found at the end of the Research Report.

Product design and development

Product overview

MyLab Foundational Skills is a mastery and competency-based online platform. It is designed to assess and remediate reading, writing, mathematics, study skills, and digital literacy skills to prepare students for college and careers.

Students first complete a diagnostic assessment in MyLab Foundational Skills to identify their strengths and weaknesses. Then, from the results of that diagnostic assessment, MyLab Foundational Skills generates a personalized learning path that takes students through Pearson content, aiming to systematically remediate their skills.

This could be required for students on a non-credit bridge program to be accepted into a degree program, or for students on a remediation program before completing a certification-based program.

MyLab Foundational Skills can be used with a number of textbooks written in the relevant disciplines.

MyLab Foundational Skills is designed to enhance and improve the following outcomes:

- Engage students in a positive learning experience — by allowing them to work at their own pace and level
- Accelerate learning — by generating Personalized Learning Paths for each student, based on strengths and weaknesses identified by the path builder diagnostic test
- Prepare students to achieve higher levels of attainment and ultimately qualify for credit-bearing courses

The full list of the outcomes this product is intended to support, accompanied by a brief description, can be found in the appendix of this report.

Foundational research underpinning the design

The design of MyLab Foundational Skills incorporates numerous principles from learning science — diverse, transdisciplinary fields that seek to understand how humans learn. What follows is a summary of some specific learning science research that underpins the design of MyLab Foundational Skills.

Adaptivity

Adaptive learning tools are defined as “technology-based artifacts that interact with students and vary presentation based upon that interaction” (Murray & Perez, 2015). Research has found that well-designed adaptive systems can be as effective as human tutors (VanLehn, 2006, 2011), and identified two prevalent types of adaptivity in learning technologies.

MyLab Foundational Skills uses elements of both kinds of adaptivity to deliver a personalized learning experience for each student.

One type relates to adaptive responses to student inputs, such as immediate feedback that is specific to the student’s attempt. When students make an error on assessment items in MyLab Foundational Skills, they often receive wrong-answer feedback specifically written to address that particular error (see **Feedback** below).

The other type of adaptivity relates to modifying a learning sequence based on the student’s current proficiency. One way in which this can be done is by estimating mastery based on student performance and ensuring that students receive enough practice to achieve fluency with the content. This “Knowledge Tracing” has been used to great effect in educational research (e.g., Corbett & Anderson, 1995).

Personalized Learning Paths provide each student with a series of learning activities based on their performance on previous assessments. These activities target each student’s specific areas for improvement.

These features are designed to accelerate learning.

Scaffolding and fading

Research has found that novices learn and process information in fundamentally different ways to those with more background knowledge (Chi, Feltovich, & Glaser, 1981). Specifically, novices lack a body of relevant knowledge and strategies to draw upon to help them solve new problems or learn new information. As such, it is critically important to provide novice students with “scaffolds”, or supports, to help them achieve learning outcomes that might otherwise be out of reach.

MyLab Foundational Skills demonstrates scaffolding by embedding a variety of learner support tools into practice opportunities. These tools, which include *Help Me Answer This* and *View an Example*, help to scaffold learning with the goal of improving students’ likelihood of increased achievement.

As students gain proficiency, learning opportunities in MyLab Foundational Skills transition from being highly scaffolded and knowledge-based to more open-ended and focused on conceptual understanding and adaptation of knowledge. This structure follows research on the “expertise-reversal effect,” which has shown that students benefit when scaffolding is gradually removed or “faded” as they progress from novice to expert reasoning and problem-solving (Kalyuga, Ayres, Chandler, & Sweller, 2003).

Feedback

The role of feedback in promoting successful learning outcomes is well documented (Hattie & Timperley, 2007). When students receive feedback indicating that they have made an error, this presents an opportunity to provide supplemental information that could help the student address whatever issue is keeping them from answering correctly (e.g., insufficient background knowledge, a problem-solving error, or a particular misconception).

MyLab Foundational Skills items provide students with immediate feedback on their performance. In many instances, wrong answer feedback also includes information addressing the specific error made. This aligns with research demonstrating that feedback that elaborates on students’ performance is more effective for learning than feedback that indicates only correctness (Van der Kleij, Feskens, & Eggen, 2015).

Memory strategies

A number of research-supported strategies have been developed to optimize the presentation of information students need to learn. These draw on research into memory, and focus on improving retrieval (i.e., recalling information when it is needed). Research has found that increased repetition is more effective than isolated presentations of information in helping students learn (Karpicke & Roediger III, 2010).

MyLab Foundational Skills assessments are designed to deliver information in a way that supports this kind of long-term retention through timely repetition, with the goal of accelerating learning.

History and reach of MyLab Foundational Skills

MyLab Foundational Skills was developed from the ground up to address the needs of adult learners. It serves high school students engaging in early intervention, college students building the requisite skills for success, and returning adult students preparing to re-enter education or further their career credentials.

MyLab Foundational Skills is currently used by over 130,000 students a year predominantly in North America, although it has been used in regions including South Africa, Australia, and the United Arab Emirates.

MyLab Foundational Skills was launched in 2011 as MyFoundationsLab. There are now 14 versions of MyLab Foundational Skills. Each of these addresses the needs of specific college and career readiness initiatives, such as high school equivalency preparation, adult basic education and career and skills readiness in the global context.

Intended product implementation

We aim to keep MyLab Foundational Skills flexible enough to allow our customers to make their own choices about how they want to implement it, and to allow them to tweak their practice over time to improve the experience and outcomes.

How customers implement MyLab Foundational Skills can vary according to the type of institution, the level of student (i.e., high school-aged, college-aged, or adult), the class size, the instructional model (e.g., blended, emporium, or a hybrid), and the learning context. Contexts in which MyLab Foundational Skills is used include:

- Adult Basic Education programs
- High School Early Intervention
- GED 2016 programs
- Transitional Studies and Bridge Programs
- Placement Test Prep
- “Fast Track” courses and Boot Camps
- Non-Course Based Options (NCBOs)
- Developmental Course Redesign
- Independent “Self Study”
- First Year Experience/Orientation/Student Success
- Tutoring and Academic Support
- Student Athletic Programs
- As a Prerequisite for Occupational Training
- Competency-Based Learning
- Contextualized Instruction

Customers using blended instruction models have told us that they have seen a greater impact when MyLab Foundational Skills is used to:

- Conduct mini-lessons based on group needs
- Facilitate students’ independent work, offering direct instruction

Customers using emporium instruction models have told us that they have seen a greater impact when MyLab Foundational Skills is used to let students progress at their own pace, and to access one-on-one instruction when they encounter difficulties.

Customers using hybrid instruction models have told us that they have seen a greater impact when MyLab Foundational Skills is used to help students combine self-paced and guided instruction to complete online assignments and assessments.

While educators who have used each of these implementation approaches have reported success with the use of MyLab Foundational Skills, studies would be needed to identify whether different approaches can be associated with different levels of learner outcomes.

Product research

Given the alignment of MyLab Foundational Skills with the learning science research discussed in the **Product design and development** section above, we hypothesize that usage of MyLab Foundational Skills will have a positive relationship with learner outcomes, particularly in terms of providing a positive learning experience, accelerating learning, and preparing students for higher levels of attainment (see Appendix for the full list of intended outcomes). The purpose of the research done to date was to explore the relationship between MyLab Foundational Skills usage and students' level of competence or standard of achievement.

For this first phase of our efficacy journey, we mainly focused on exploring correlational rather than causal relationships between our products and learner outcomes. Demonstrating causation is complex and requires significant investment; our correlational studies identify relationships that may be worth investigating further with causal study designs in future research.

Existing research

In 2018 Pearson researchers completed a systematic search and review of research articles published since 2012 that assessed the impact of MyLab Foundational Skills on learner outcomes. Our criteria for the review and inclusion of existing published research on our products were designed based on US Department for Education What Works Clearinghouse guidance. Based on these guidelines, in order for research to be included in this Efficacy Report on MyLab Foundational Skills it needed to meet a number of criteria, including that the study was published in the past five years, examined at least one intended learner outcome category, and reported results in enough detail that the research could be properly evaluated. For more information on this see the [Pearson Efficacy Reporting Framework dated April 3 2018](#).

In our initial screening, we discovered 18 studies. After an initial review we found that two contained information relevant to MyLab Foundational Skills. Following an in-depth review, we discovered that one study met the necessary criteria to be included in this efficacy report. The remaining studies did not meet these criteria and are not included. For the initial screening list and a list of the subset of studies containing information relevant to MyLab Foundational Skills but that did not meet the criteria to be included here see the [Pearson Efficacy Reporting Framework dated April 3 2018](#).

Research studies

There is one existing published study that forms the basis of the Efficacy Report for MyLab Foundational Skills and one new study that has been conducted by SRI International. The research questions and findings for each study are set out in detail below, including the efficacy statements generated by those studies.

Study 1

Study citation	Evaluating Digital Learning for Adult Basic Literacy and Numeracy (2017), Murphy, R., Bienkowski, M., Bhanot, R., Wang, S., Wetzels, T., House, A., Leones, T., Van Brunt, J. — Menlo Park, CA: SRI International
Research study contributors	Patti Constantakis, Tamara Thompson, and Shannon Sims from Digital Promise and Mockingbird Education Advisory panel members — Richard Mayer, Lynda Ginsburg, John Fleischman, John Sabatini, David Rosen, Gabe Martinez Cabrera, and Daphne Greenberg Matthew Muench from The Joyce Foundation SRI Education and Adult Basic Education

Research questions	<ol style="list-style-type: none"> 1. Can the use of well-designed, well-implemented online learning technologies result in gains in literacy, numeracy, and other foundational skills for low-skilled adults compared with instructional programs that did not use these technologies? 2. Did students who used the products more frequently show greater gains in learning outcomes and skill development than students who used the products less often?
Related intended outcomes category	Level of competence and standard of achievement
Study design	<p>Comparative</p> <p>The study used propensity score matching to compare the reading, math, and language achievement of students using online learning products in their course to similar students (in terms of prior achievement, age, and gender) who did not use such a product in their course.</p> <p>The five online learning products considered in the study were:</p> <ul style="list-style-type: none"> — MyLab Foundational Skills — ALEKS, a McGraw-Hill Education product — Reading Horizons Elevate, a Reading Horizons product — Core Skills Mastery, a CSMLearn product — GED Academy, an Essential Education product <p>Relational (correlational, not predictive)</p> <p>The study also looked at the relationship between average number of hours students spent logged into the products each day and their achievement in reading, math, and language.</p>
Metrics studied	— Performance on the reading, math, and language Tests of Adult Basic Education
Description of sample	<p>The students in the study attended 13 sites and were enrolled in 14 different adult basic education (ABE) programs, with incoming math and/or reading skills at the 4th to 9th grade levels. None of the students were enrolled in an English as second language (ESL) program. The instructors were all teaching at the ABE sites.</p> <p>MyLab Foundational Skills was utilized at three of the tested sites:</p> <ul style="list-style-type: none"> — Site 9 (AZ), a community college — Site 10 (IN), a community college — Site 11 (RI), a nonprofit adult education center <p>Across the 13 sites, classroom models used for course implementation varied between online, blended learning, hybrid learning, and supplemental models. Site 9 used blended and hybrid models, site 10 used online and hybrid models, and site 11 used the hybrid model.</p> <p>Only results from site 9 are summarized here. Site 11 was a nonprofit adult education center rather than a college or university, which is not consistent with the target population of users. Site 10 was dropped from the analysis because it did not administer a post-test, and too few students matriculated to the credit-bearing course to analyze pass rates.</p>
Sample size	At site 9, there were 9 instructors and 219 students.

Analysis

A quasi-experimental design using propensity score matching constructed two groups of students: those using an online learning product and those not using an online learning product. General linear models were used to estimate the impact of using each of the five products by comparing the standardized assessment scores of students using the product to those that did not use the product. General linear modeling was also used to estimate the relationship between time spent logged into the product and achievement.

A subset of students were included in the impact analysis if they took both the pre- and post-tests. Impacts for MyLab Foundational Skills, which can provide instruction in both reading and math, were estimated separately for students who used the product in a particular subject area because some students only used it for one area or the other, not both.

Results

The study estimated 13 separate learner outcomes across the five products. Only two of these outcomes showed significant differences between the students using the product and students not using the product: Core Skills Mastery showed a positive impact on math and Reading Horizons Elevate showed a negative impact on reading. All the other effects (including for MyLab Foundational Skills) were not significant.

The study estimated 19 relationships between intensity of use and achievement across the various products and sites. A statistically significant relationship was found in only two of these analyses: use of Reading Horizons Elevate was positively associated with reading scores in one site and use of Core Skills Mastery was negatively associated with reading scores in one site. All other analyses showed no significant relationships, including for MyLab Foundational Skills.

Thus, across the five different online learning products, there were almost no significant differences in achievement between students who used them and similar students who did not use them. In addition, simply spending more time logged into the products was not generally associated with higher achievement.

Efficacy statements

In the context of this study, conducted at a community college in the state of Arizona, for students enrolled in ABE courses, Pearson is able to make the following comparative statement about the efficacy of MyLab Foundational Skills:

- There were no significant differences in reading, math, and language scores between students who used MyLab Foundational Skills and students who did not use MyLab Foundational Skills, when adjusting for pre-test scores, age, and gender.

In the same context, Pearson is able to make the following relational (correlational, not predictive) statement about the efficacy of MyLab Foundational Skills:

- There were no significant relationships between average number of hours spent per day in MyLab Foundational Skills and scores on reading, math, and language tests.

Limitations and generalizability*Sample limitations:*

The analytic sample used for the impact analysis for site 9 was relatively small, based on fewer than 100 students in each of the two groups.

Study design:

Although students using MyLab Foundational Skills were matched to those not using the product in terms of age, gender, and prior achievement, students were not randomly assigned to the treatment or comparison condition (i.e., the groups using or not using MyLab Foundational Skills). In addition, the researchers were unable to control for all possible confounding factors, such as socioeconomic status of the students, other demographic factors, differences in product implementation and instructional quality. Thus, any relationships observed in this study are correlational in nature, not causal.

Product implementation:

The researchers reported that the median total time that site 9 students spent logged into the product was fewer than six hours over the course of the entire semester, and the median number of days on which students logged onto the tool was only five. For the impact analysis, they dropped from the analysis any students who had spent fewer than 10 hours logged into the product over the course of the semester; this would equate to less than one hour spent using the product per week, over a typical 15-week semester.

Metrics:

The primary indicator of product use in this study was the total number of hours students spent logged into the platform. However, this indicator does not distinguish between time spent actively engaging with assignments and idle time.

Future research

Future research could:

- Explore whether these findings can be replicated at other schools and with larger samples
 - Better document how the product was used, to confirm that it was implemented as intended
 - Go beyond time spent in the platform to analyze students' behaviors, such as the number of attempts they make on assignments and their performance on those assignments
 - Make use of more rigorous research designs; for example, an experimental research design could assess whether use of MyLab Foundational Skills leads to higher scores on assessments or completion rates — that is, whether the relationship we observed is causal in nature
-

Study 2

Study citation	An analysis of the relation between student usage and course outcomes for MyLab Math ¹ and MyLab Foundational Skills — SRI International — March 2018
Research study contributors	<i>SRI International</i> — Louise Yarnall — Jared Boyce — Tallie Wetzel — Erica Snow <i>Other contributors</i> — Robert Murphy
Research questions	1. What were the trends in the students' use and performance in the courseware? 2. Controlling for student demographic and prior achievement variables, is student courseware use and performance associated with course outcomes?
Related intended outcomes category	Level of competence and standard of achievement
Study design	Relational (correlational, not predictive) This was a follow-up to a 2016 study on the Adaptive Learning Market Acceleration Program (ALMAP) ² . In the 2016 study (Yarnall, Means, & Wetzel, 2016), researchers gathered quasi-experimental evidence on course outcomes, cost data, and both instructors' and students' experiences of ALMAP courseware. The evidence gathered did not include the titles of the course texts used with MyLab Foundational Skills. One notable gap in this original ALMAP study was the lack of access to and analysis of the data on student product usage and performance generated by the courseware. In 2016, to further understand the usage of its own courseware products in the ALMAP courses, Pearson hired SRI International, the same external research institute that conducted the original ALMAP study, to further examine how students' use of, and performance in, MyLab Foundational Skills related to course outcomes.
Metrics studied	— Course grades — Passing the course
Description of sample	SRI International examined MyLab Foundational Skills usage and course outcome data collected in 2014 and 2015 among students attending Rio Salado College, a two-year college that was part of the original ALMAP study. Rio Salado College students in the sample were mostly women (63%), were highly representative of diverse races/ethnicities (48% White or Asian; 43% other populations), were enrolled mostly part time (73%), and more than half relied on federal Pell grant assistance.

¹ Though this study focused on both MyLab Math and MyLab Foundational Skills, only the MyLab Foundational Skills findings are reported here.

² The Bill & Melinda Gates Foundation initiated ALMAP to advance evidence-based understanding of how adaptive learning technologies such as adaptive courseware could improve opportunities for low-income adults to learn and to complete postsecondary credentials.

Sample size 964 students (sample in the original ALMAP study);
327 (final analytic sample for follow-up study)

For this follow-up study, Pearson provided SRI with usage data for MyLab Foundational Skills, and Rio Salado College provided Pearson and SRI with student identifiers to connect the original ALMAP study data to the Pearson usage data.

The reduction in the analytic sample size compared to the sample from the original study is associated with this connection process. To be included in the analytic sample for this study, a student record from the original ALMAP study had to meet several requirements.

1. The students had to be unique, meaning SRI only included data from a single term.
If a student appeared in more than one term (e.g., because they re-enrolled in the same course over multiple terms), only the student's first term was used.
2. The records had to have a complete set of Pearson usage variables (no missing data).
3. A complete set of demographic, prior achievement (i.e., pre-test proxy data), and course outcome variables was available (no missing data).

Analysis Students' usage of MyLab Foundational Skills was measured by number of homework attempts and number of attempts at mastering learning objectives. Students' performance was measured by mean homework achievement scores and number of learning objectives mastered.

Both single-level and hierarchical linear models were developed to explore the extent to which MyLab Foundational Skills usage and performance data were related to students' course outcomes — specifically course completion and course grades. The models controlled for student background characteristics, including gender, ethnicity, Pell status, enrollment status (full-time or part-time), and measures of student prior achievement or a proxy, when available.

Results Increased homework attempts and mastering a higher number of courseware learning objectives were associated with statistically significant higher course grades and an increased likelihood of passing the course.

However, there was a negative association between the number of learning objectives attempted and both course grades and the likelihood of passing the course. This could indicate that struggling students were simply making more attempts, without having mastered the objectives.

Efficacy statements

In the context of this study, conducted at Rio Salado College, Pearson is able to make the following relational (correlational, not predictive) statements about the efficacy of MyLab Foundational Skills:

- Each additional learning objective mastered was associated with a 3% increase in the odds of passing the course.
- Each additional homework attempt was associated with a 6% increase in the odds of passing the course.
- Each additional attempt at mastering a learning objective was associated with a reduction in a student's odds of passing a course of 3%.
- Making 10 additional homework attempts was associated with an increase in a student's final course grade of 0.11 grade point.
- Mastering 10 additional learning objectives was associated with an increase of 0.13 grade point.
- Making 10 additional learning objective attempts was associated with a decrease in final course grade of 0.10 point.

It should be noted that these statements reflect a relationship between MyLab Foundational Skills and performance above and beyond students' prior achievement. Therefore, it is not simply the case that high-achieving students tend to perform well on multiple aspects of the course. The relationships expressed above were calculated across all students in the sample and capture the contribution of MyLab Foundational Skills to course performance once prior achievement has already been accounted for.

Limitations and generalizability

Results are correlational and not causal:

SRI attempted to control for any bias that could be introduced by students' background characteristics and prior skill level by including measures of student background characteristics and incoming skill level. Despite these controls, these measures likely do not capture all the possible confounding factors that might influence product use and course outcomes, such as student motivation, family support, and prior learning experiences with technology. We are, therefore, not able to rule out the influence of all the confounding factors on students' achievement in the course.

The generalizability of the study:

The study made use of data at one institution. Replication of findings at other institutions (such as a four-year college) would be needed to be able to generalize the findings.

Future research

Future research could explore whether these findings can be replicated at other schools so we can understand more about what works, when, where, how, for whom and why. Future studies could also examine student engagement and learning experience in MyLab Foundational Skills, and whether use of the product leads to accelerated learning and better preparation for credit-bearing courses. Such studies would require more rigorous research designs. For example, an experimental or quasi-experimental research design could assess whether use of MyLab Foundational Skills leads to higher scores on assessments or completion rates — that is, whether the relationship we observed is causal in nature.

Read about this research in more detail in our [Technical Report](#)

References

- Chi, M. T., Feltovich, P. J., & Glaser, R. (1981). Categorization and representation of physics problems by experts and novices. *Cognitive Science*, 5(2), 121–152.
- Corbett, A. T., Anderson, J. R. (1995). Knowledge tracing: Modeling the acquisition of procedural knowledge. *User Modeling and User-Adapted Interaction*, 4(4), 253–278.
- Hattie, J. & Timperley, H. (2007). The power of feedback. *Review of Educational Research*, 77(1), 81–112.
- Kalyuga, S., Ayres, P., Chandler, P., & Sweller, J. (2003). The expertise reversal effect. *Educational Psychologist*, 38(1), 23–31.
- Karpicke, J., & Roediger III, H. L., (2010). The critical importance of retrieval for learning. *Science*, 319, 966–968.
- Murray, M. C., & Perez, J. (2015). Informing and performing: A study comparing adaptive learning to traditional learning. *Informing Science: The International Journal of an Emerging Transdiscipline*, 18, 111–125.
- Van der Kleij, F. M., Feskens, R. C., & Eggen, T. J. (2015). Effects of feedback in a computer-based learning environment on students' learning outcomes: A meta-analysis. *Review of Educational Research*, 85(4), 475–511.
- VanLehn, K. (2006). The behavior of tutoring systems. *International Journal of Artificial Intelligence in Education*, 16, 227–265.
- VanLehn, K. (2011). The relative effectiveness of human tutoring, intelligent tutoring systems, and other tutoring systems. *Educational Psychologist*, 46(4), 187–221.
- Yarnall, L., Means, B., & Wetzel, T. (2016). *Lessons learned from early implementations of adaptive courseware*. Menlo Park, CA: SRI International. Retrieved from https://www.sri.com/sites/default/files/brochures/almmap_final_report.pdf

Appendix 1: full list of intended outcomes

Outcomes related to learner access and experience

Intended outcome 1

Learners can successfully use MyLab Foundational Skills with little technical support.

MyLab Foundational Skills is designed to be accessible at any time via phones and tablets, as a means of increasing engagement in the classroom and beyond.

Intended outcome 2

Learners gain access to learning at their level (reading, writing, math).

All learners with MyLab Foundational Skills first complete a diagnostic assessment to identify their individual strengths and areas for improvement. They then work on a personalized learning path so that they each work at their own level and pace of learning.

Intended outcome 3

Learners can access digital learning materials from personal computer, tablet or mobile.

MyLab Foundational Skills is designed to be accessed remotely and on any device, allowing students to access learning materials from anywhere, at any time.

Intended outcome 4

Learners are engaged and have a positive learning experience.

MyLab Foundational Skills generates a personalized and adaptive learning path. Students are able to work at their own pace and level, which allows them to have a more positive learning experience.

Outcomes related to timeliness of completion

Intended outcome 5

All learners complete path builder diagnostic assessment.

MyLab Foundational Skills is designed to encourage all students to complete the path builder diagnostic test. This test identifies students' strengths and weaknesses, allowing MyLab Foundational Skills to generate an individualized learning path for the user.

Intended outcome 6

Learners complete all assigned modules in MyLab Foundational Skills.

MyLab Foundational Skills is implemented in a variety of modalities, depending on the type of institution in which it is used, the level of learner, and the class size. Within blended instruction models, students use MyLab Foundational Skills to complete assigned reading and homework prior to class lectures. They may then also complete chapter quizzes within the class or lab time. MyLab Foundational Skills allows learners the flexibility to learn both in and out of the classroom. Increased flexibility allows learners to more easily complete required instructional tasks successfully and on time.

Outcomes related to competence and standards of achievement.

We have evidence related to this category of intended outcomes for MyLab Foundational Skills. Find it under "Product research".

Intended outcome 7

Learners develop basic skills necessary to complete their post-secondary education.

As MyLab Foundational Skills allows assessment of student skills and then assigns a personalized learning path based on identified needs, use of the product is intended to support higher levels of student achievement in specific skills and academic competencies.

Intended outcome 8

Learners achieve mastery of key topic areas identified through path builder.

MyLab Foundational Skills is intended to instill core topics in students. Features such as path builder identify and focus on these topic areas, encouraging students to retain key concepts.

Intended outcome 9

Learners improve their placement level but still test into developmental sequence.

MyLab Foundational Skills is designed to support students and meet their individual needs. It allows them to develop at their own pace to gain mastery of key concepts and ultimately improve their placement level.

Intended outcome 10

Learners remediate diagnosed skills gaps.

MyLab Foundational Skills generates a personalized and adaptive learning path. This allows students to work on the specific areas they needed to improve, systematically remediating their skills.

Outcomes related to learner progression/next steps.

Intended outcome 11

Learners qualify for credit-bearing courses.

MyLab Foundational skills offers comprehensive content that prepares students to achieve higher levels of attainment and ultimately qualify for credit-bearing courses.

Intended outcome 12

Learners retake the placement test and place into a credit bearing course.

MyLab Foundational Skills provides tools, instructional support, and individualized learning capabilities to allow learners to achieve academic goals and progress to higher levels of learning defined by the learner. For example, MyLab Foundational Skills for ACT® Prep is designed to help potential test-takers build requisite skills necessary to demonstrate their proficiency on the ACT®. ACCUPLACER®//MyLab Foundational Skills allows learners to bypass developmental coursework upon entry to college and immediately enroll in credit bearing courses. MyLab Foundational Skills for Adult Basic Education offers personalized learning paths in ESL, basic reading and writing skills, numeracy skills, and functional and workplace skills.

Intended outcome 13

Learners achieve success in their gateway courses (English, math), persist, and pursue a desired major.

Students are taught skills in the context of key topics that relate to more advanced courses. Knowledge gained from MyLab Foundational Skills should encourage students to progress to the next course.

Intended outcome 14

Learners achieve a credential/degree or transfer.

The library of multimedia lessons and assessments in MyLab Foundational Skills cover all of the objectives to assist students to go on to achieve a credential/degree or transfer.

Intended outcome 15

High school students, whose college readiness levels are measured in 10th–11th grade to predict performance on high stakes placement assessments, improve placement scores when retested in 12th grade after MyLab Foundational Skills bridge program.

MyLab Foundational Skills aims to improve students' level of learning by creating a personal adaptive learning path for individual students, encouraging improvement.



Independent limited assurance report to the directors of Pearson plc

The directors of Pearson plc (“Pearson”) engaged us to provide limited assurance over the efficacy statements clearly identified by the box titled ‘Efficacy statements’, including reference to the study design type, in the Pearson MyLab Foundational Skills Efficacy Research Report dated April 3 2018 (“Research Report”).

Our conclusion

Based on the procedures we have performed and the evidence we have obtained, nothing has come to our attention that causes us to believe that the efficacy statements set out in the Pearson MyLab Foundational Skills Research Report have not been prepared and reported, in all material respects, in accordance with the Pearson Efficacy Reporting Framework dated April 3 2018.

This conclusion is to be read in the context of what we say in the remainder of our report.

Efficacy statements

The scope of our work was limited to assurance over the efficacy statements clearly identified by the box titled ‘Efficacy statements’, including reference to the study design type, in the MyLab Foundational Skills Research Report. Our assurance does not extend to other information presented in the Research Report.

Professional standards applied and level of assurance

We performed a limited assurance engagement in accordance with International Standard on Assurance Engagements 3000 (Revised) *Assurance Engagements other than Audits and Reviews of Historical Financial Information*, issued by the International Auditing and Assurance Standards board. A limited assurance engagement is substantially less in scope than a reasonable assurance engagement in relation to both the risk assessment procedures, including an understanding of internal controls, and the procedures performed in response to the assessed risks.

Our independence and quality control

We applied the Institute of Chartered Accountants in England and Wales (ICAEW) Code of Ethics, which includes independence and other requirements founded on fundamental principles of integrity, objectivity, professional competence and due care, confidentiality and professional behaviour.

We apply International Standard on Quality Control (UK) 1 and accordingly maintain a comprehensive system of quality control including documented policies and procedures regarding compliance with ethical requirements, professional standards and applicable legal and regulatory requirements.

Our work was carried out by an independent and multi-disciplinary team including educators, statisticians, and experts in reporting and assurance.

Reporting and measurement methodologies

The efficacy statements need to be read and understood together with the Pearson Efficacy Reporting Framework dated April 3 2018 (the “Framework”), available on Pearson’s website at <https://www.pearson.com/efficacy-reporting-framework>. The absence of a fully comprehensive set of generally accepted rules for identifying learner outcomes and defining, assessing and reporting the efficacy of educational products allows for

different, but acceptable, ways of measuring product efficacy and reporting findings as efficacy statements. This could affect comparability between Pearson’s efficacy reporting and that of other organisations.

Work done

We are required to plan and perform our work in order to consider the risk of material misstatement of the efficacy statements. A material misstatement would be an efficacy statement that does not reflect the study design and quality of underlying research or the omission of key information from a relevant study.

In doing so, we:

- made enquiries of relevant Pearson management;
- evaluated the design of the Framework including key structures, systems, processes and controls for managing, generating and reporting the efficacy statements;
- tested all 19 controls across the 8 stages of the Framework;
- confirmed that all management reviews were performed by at least two members of Pearson’s Efficacy & Research team;
- performed substantive testing on a sample basis of the data that underpins the research studies and the resulting efficacy statements, and the controls over the completeness and accuracy of that data (supported by Pearson Internal Audit in those instances where student data was subject to confidentiality restrictions);
- assessed the quality and conclusions of the underlying research studies;
- inspected the statistical analysis to assess whether the efficacy statements are valid, supportable and consistent with the underlying research studies;
- independently re-performed screening of relevant external public research studies and compared to that done by Pearson;
- assessed the efficacy statements and underlying Technical Report(s) for consistency with the Framework; and
- reviewed the product’s efficacy web page, Research Report, and Technical Report(s) for alignment of research studies and efficacy statements.

Pearson responsibilities

The directors of Pearson are responsible for:

- designing, implementing and maintaining internal controls over information relevant to the preparation of efficacy statements that are free from material misstatement, whether due to fraud or error;
- establishing an objective framework for preparing and reporting efficacy statements;
- preparing and reporting efficacy statements in accordance with the Framework; and
- the overall content of the Framework and the Research Report.

Our responsibilities

We are responsible for:

- planning and performing the engagement to obtain limited assurance about whether the efficacy statements are free from material misstatement, whether due to fraud or error;
- forming an independent conclusion, based on the procedures we have performed and the evidence we have obtained; and
- reporting our conclusion to the directors of Pearson.

Inherent limitations

Efficacy research, and the resulting efficacy statements, reflect the implementation and use of a product in a particular context. It would not be appropriate to assume a product would always generate similar outcomes in other contexts and/or in the future.

Intended users and purpose

This report, including our conclusions, has been prepared solely for the board of directors of Pearson in accordance with the agreement between us, to assist the directors in reporting Pearson MyLab Foundational Skills efficacy statements, in accordance with the agreement between us dated 9 August 2017. We permit this report to be disclosed onlineⁱ at <https://www.pearson.com/corporate/efficacy-and-research/efficacy-reports> in respect of the MyLab Foundational Skills Research Report to assist the directors in responding to their governance responsibilities by obtaining an independent assurance report in connection with the efficacy statements. To the fullest extent permitted by law, we do not accept or assume responsibility to anyone other than the board of directors and Pearson for our work or this report except where terms are expressly agreed between us in writing.

PricewaterhouseCoopers LLP

PricewaterhouseCoopers LLP
Chartered Accountants
London
3 April 2018

ⁱ The maintenance and integrity of Pearson's website is the responsibility of the directors; the work carried out by us does not involve consideration of these matters and, accordingly, we accept no responsibility for any changes that may have occurred to the reported efficacy statements or the Framework when presented on Pearson's website.



Pearson