Efficacy Report

MyFoundationsLab

March 23, 2016

Product Summary

MyFoundationsLab is a mastery-based online program for assessing and remediating reading, writing, mathematics, and study skills. MyFoundationsLab does this by first applying a diagnostic assessment to identify students' strengths and weaknesses. Then, from the results of that diagnostic assessment, MyFoundationsLab generates a personalized and adaptive learning path that takes students through Pearson trusted content, systematically remediating their skills. In this way, students are able to master skills at their own level, working at their own pace.

MyFoundationsLab features:

- Diagnostic assessment and personalized learning paths to identify and remediate student skills gaps

- Adaptive capability via Knewton

- Trusted, pre-loaded content

- Expansive coverage that provides instruction, practice, and assessment on over 3,028 learning objectives in English, mathematics, study skills, English as a second language (ESL) skills, and digital literacy

- 50,000+ item question bank

- Flexibility to adjust the course to meet the needs and objectives of a particular program

- Available integrations with live, on-demand tutors

- Powerful XL gradebook and reporting

Intended Outcomes

Overview of Intended Outcomes

Each MyFoundationsLab course offers comprehensive content including assessment, instruction, practice and post-assessment – that may be used as-is or easily customized to the specific objectives of a program. MyFoundationsLab uses diagnostic assessment to generate a personalized learning path that supports curriculum and skills mastery. The adaptive learning path allows students to learn at a level and pace that is better aligned to their individual needs, with the ultimate goal of an improved learning experience and higher levels of achievement for better overall outcomes.

Intended Outcome 1: Learners have a positive learning experience

MyFoundationsLab generates a personalized and adaptive learning path. In this way, students are able to work at their own pace and level, which allows them to have a more positive learning experience.

Intended Outcome 2: Learners have access to learning at an appropriate level

All learners with MyFoundationslab 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 complete tasks on time and complete the course

MyFoundationsLab 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 MyFoundationsLab to complete assigned reading and homework prior to class lectures and may then also complete chapter quizzes within the class or lab time. MyFoundationsLab allows learners the flexibility to learn both within and outside the classroom. Increased flexibility allows learners to more easily complete required instructional tasks successfully and on time.

Intended Outcome 4: Learners improve in skills or competence

As MyFoundationsLab 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 5: Learners progress to the next level of learning

MyFoundationsLab 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, MyFoundationsLab for ACT® Prep is designed to help potential test-takers build requisite skills necessary to demonstrate their proficiency on the ACT®; ACCUPLACER®//MyFoundationsLab allows learners to bypass developmental coursework upon entry to college and immediately enroll in credit-bearing courses; and MyFoundationsLab for Adult Basic Education offers personalized learning paths in ESL, basic reading and writing skills, numeracy skills, and functional and workplace skills.

Foundational Research

Overview of Foundational Research

MyFoundationsLab is an instructional program based on providing students with a learner-centered environment that builds and supports developmental progression through the course. Each MyFoundationsLab course includes diagnostic and competency-based learning activities that are personalised and adaptive.

The design of MyFoundationsLab is underpinned by several learning design principles:

Adaptivity

Successful instruction must help students to quickly establish a foundation of knowledge and skills, as well as provide opportunities and support for developing more advanced levels of mastery. Adaptive learning technologies, such as the engine used in MyFoundationsLab, are one promising approach that research has explored to address this. Specifically, as students gain proficiency, the learning opportunities can transition from being highly-scaffolded and knowledge-focused to the more open-ended and focused on conceptual understanding and adaptation of knowledge, following research on the 'expertise-reversal effect' (Kalyuga, Ayres, Chandler, & Sweller, 2003). The adaptive functionality in MyFoundationslab (powered by Knewton) provides specific and immediate feedback so students can build confidence and proficiency in their skills. Subsequent items are then selected based on students' performances on previous items.

Scaffolding and Fading

Research has found that novices learn and process information in fundamentally different ways than those with more background knowledge (Chi, Feltovich, & Glaser, 1981). Specifically, novices require more support, as they do not have 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 *scaffold*, or support, novice learners in a variety of ways.

In MyFoundationsLab, there are a variety of learner support tools, including specific, clear, concise, and timely feedback that is provided in association with practice activities to help scaffold learning and improve the likelihood of increased achievement

Learner Feedback

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

In MyFoundationslab, when wrong answers are given, feedback is also provided with help on how to correct errors. In addition, resource tools such as *Ask My Instructor, Help Me Answer This, and View an Example* can further help students with the assessments.

Memory Strategies

A number of research-supported strategies for optimizing the presentation of to-be-learned information have been developed. These draw upon bodies of research into memory, and focuses in particular on improving 'retrieval' (i.e. how well it can be recalled when needed). A very robust finding is that increased repetition can indeed help students to learn, compared to isolated presentations of information, as described by research on the benefits of 'retrieval practice' (see Karpicke & Roediger III, 2010). This research demonstrates that, generally speaking, learners benefit from more practice. In MyFoundationsLab assessments, items are given in a fashion that supports long-term retention through timely repetition, thereby aligning with research on the benefits of 'retrieval practice.'

Teacher Feedback

In MyFoundationslab, instructors can see a student's basic performance from overview reports (e.g., number of items correct/incorrect, attempted) as well as details around specific learning objectives with a gradebook that allows for tracking of the student's performance as it corresponds to the learning outcomes for the course. '*Item analysis*' allows instructors to track and adapt individual tasks and specific learning objectives within the course as and when needed.

Intended Product Implementation

Overview of Intended Product Implementation

MyFoundationsLab has a complex market. There is a broad spectrum of users-as-instructors that includes people who are not necessarily fully prepared educators. In some cases, they are skills specialists who may or may not have training in the discipline (i.e. a reading instructor with little knowledge of math teaching). It is not always clear how the product is being implemented and every user account is different. In order to address this, the MyFoundationsLab product team has looked to create standardized implementation models across the different customer types with a new implementation guide.

The contexts in which MyFoundationsLab is used (as listed on the MyFoundationsLab website) include: *High School Early Intervention, GED® 2014 Programs, Transitional Studies & 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 & Academic Support, Student Athletic Programs, Prerequisite for Occupational Training, Competency-Based Learning, Contextualized Instruction.*

MyFoundationsLab is implemented in a variety of modalities, depending on the type of institution in which it is used, the level of learner (e.g. high school-aged, college-aged or adult), and the class size. Within blended instruction models, students use MyFoundationsLab to complete assigned reading and homework prior to class lectures and may then also complete chapter quizzes that account for 10% to 60% of their course grade. In the emporium model, students use MyFoundationsLab in computer labs or computer classrooms staffed by instructors, professional tutors, and/or peer tutors. Students progress through the course material at their own pace and may receive one-on-one assistance when they encounter difficulties in learning the material and in progressing within the course. In the hybrid program that incorporates traditional lectures and the extensive use of technology, students attend a set amount of lectures per week and then spend time in a computer lab or on their own working with MyFoundationsLab, thereby combining 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 MyFoundationsLab, studies are needed to identify the combination of implementation modalities and the interaction with MyFoundationsLab that is associated with different levels of learner outcomes.

Product Research

Overview of Product Research

There have been 21 Educator Studies completed by instructors who have used MyFoundationsLab. These studies were originally developed by instructors to share with others their approaches to implementing MyFoundationsLab in their courses and to describe the impact of the product on their instruction and on student achievement; 19 of these studies reported increases in student test scores or course grades following the implementation of MyFoundationsLab. However, because these studies were not designed using experimental or quasi-experimental designs that could robustly attribute the changes in learner outcomes to MyFoundationsLab, for this report, Pearson researchers completed a systematic search and review of published, peer-reviewed, rigorous studies that assessed the impact of MyFoundationsLab on learner outcomes. Three correlational studies have been published in either educational journals or as a doctoral dissertation. From among these, only the doctoral dissertation provides robust information about the relationship of use of MyFoundationsLab in a summer math refresher course to changes in student knowledge of math skills necessary to succeed in college.

About the claims included in this report

In reporting causal claims about the impact of our products on learner outcomes, Pearson relies on guidance by the US Department of Education [What Works Clearinghouse](#) (WWC) to determine which available studies have been conducted and reported using the following standards of research that would yield valid and reliable information.

- **Research design.** In accordance with WWC standards, we focused on randomized controlled trials, quasi-experimental designs, regression discontinuity designs and single case designs. If conducted properly, these are the research designs that are of sufficient rigour to allow us to make causal claims.
- **Attrition.** Using WWC guidance, we consider both overall and differential attrition - the extent to which both users and non-users of the Pearson product remain in the study - in relation to each other - to determine if we could use the results from the studies.
- **Baseline equivalence.** Equivalence of the intervention and comparison groups on observable characteristics at baseline must be presented for the analytic sample in order for us to draw valid conclusions about the extent to which changes in student outcomes could be reliably and validly attributed to use of the Pearson product.
- **Outcomes eligibility.** Outcomes examined in the studies must have face validity and be of sufficient reliability for us to use the results from the outcomes. These outcomes must also be aligned to Pearson's defined learner outcomes. There must also be no over-alignment of the outcomes to the Pearson product and data collection for the outcomes must be done in the same manner for both the treatment and control groups.

Our Search and Review Process for Evidence of Impact Provided by Independent and Published Studies

The search for external studies on a particular Pearson courseware product was done primarily through Google Scholar and the rest were found through snowballing from relevant

articles on the Pearson product. In Google Scholar, the keyword of the Pearson product was used before a scan of the title and abstract was done to determine relevance. No studies earlier than 2008 were reviewed since they were probably based on an outdated version of the Pearson product. Articles that discussed implementation but did not examine any Pearson defined learner outcomes on a population in higher education were also excluded.

During our review process, it was found that some of the quasi-experimental studies did not examine baseline differences at all. Others were of slightly higher rigour in that prior differences were examined or acknowledged but no attempts were made to take into account these prior differences in the analysis. Thus, we would consider these studies correlational studies and not studies that can lead to causal claims.

The next level of better designed studies were those that tried to control for prior differences of students in some way, such as through regression analysis or analysis of covariance (ANCOVA). Other studies used random assignment. However, many of these quasi-experimental or randomized studies assigned the treatment or control condition at the class level but failed to consider clustering at the class/instructor level when there were multiple instructors involved in the study. Thus, the potential confounding effects of instructors on student achievement were not taken into account in these studies. As a result, in most cases, the estimates of the statistical reliability of the impact estimates from these studies are incorrect and misleading, leading readers to believe they should have more confidence in the results than warranted. Thus, in summary, the studies that could be used to make causal claims were those that used a rigorous research design, had acceptable overall and differential attrition rates, addressed baseline equivalence, and used the right method of analysis.

Research Studies

Mathematics Boot Camps: **A Strategy for Helping Students to Bypass Remedial Courses**	
Study Citation	Hamilton, M. A. L. (2015). *Mathematics Boot Camps: A strategy for helping students to bypass remedial courses* (unpublished doctoral dissertation). Walden University, Minneapolis, MN.
Research Study Contributors	Individual third-party researcher working on a dissertation
Type of Study	Correlation
Sample Size	136 students--Participants were incoming fall 2014 students to a community college in Washington, DC who failed to meet the cut-off for enrolling in college-level math courses in that community college.
Description of Sample	Samples were generated based on non-randomized self-selection. A total of 250 students expressed interest in the study but only 136 students attended and completed the ACCUPLACER posttest and were included in the analysis. Participants chose to be assigned to either the treatment group

	or the comparison group at the start of the study. Group sample sizes were unequally distributed with 44 treatment group participants and 92 comparison group participants. All participants were recruited from the same community college and in the same school year. 64% were under 25 years of age. For 82 of the participants with high school GPA data, their average GPA was 2.35.
Outcomes Measured	The specific learner outcome measure is: Gains (between pre-posttest scores) in mathematical knowledge and skills as measured by the ACCUPLACER test.

Introduction

This study investigated the question of whether participation in the Math Boost-Up program increased the ACCUPLACER posttest scores of incoming community college students in the experimental group more than the scores of students in the comparison group who did not participate in the program but studied on their own.

Method

A quasi-experimental nonequivalent group pretest-posttest design was used to study the association of the mathematics refresher program, MyFoundationsLab Math Boost-Up, on gains in mathematical knowledge and skills measured by the ACCUPLACER test. The participants self-selected into MyFoundationsLab Math Boost-Up treatment group or the comparison group that would study independently online using MyFoundationsLab.

A sample of 136 students participated in a two week mathematics refresher course prior to their enrollment in college. They were fall 2014 incoming students admitted to a community college in Washington, D.C. and had achieved below the cut-off needed to enroll in college-level mathematics at that community college.

Results

It was found that when 136 students participated in a 2-week mathematics refresher course prior to their enrollment in college, participating in the MyFoundationsLab with Math Boost-Up program was found to be positively associated with higher gain scores in arithmetic and marginally higher gain scores in algebra than only using MyFoundationsLab online. In this study, the gains in arithmetic were significantly different between the face-to-face and online groups (p=.004) and the gains in algebra were marginally significant (p=.07).

Discussion

The independent variable for the study was the mathematics refresher program, MyFoundationsLab Math Boost-Up, as compared to the comparison condition where students studied independently using MyFoundationsLab online. The dependent variable was the gains in mathematics knowledge and skills as measured by the ACCUPLACER test. A quasi-experimental nonequivalent group pretest-posttest study design was used and the study did not explicitly control for the covariates that would differentiate students who self-selected to the treatment group or the comparison group.

The study provides evidence of association between MyFoundationsLab Math Boost-Up (as compared to MyFoundationsLab online only) and gain scores in the ACCUPLACER test. It

only provides evidence of association because it did not explicitly control for baseline differences between the students who self-selected into the treatment group versus the comparison group, and factors that led students to choose one program over another might have had an effect on the achievement outcome.

There are a couple of main caveats associated with the study:

First caveat--self-selection. There is self-selection, not only to participate in the study but also whether to be in the treatment group or the comparison group. Specifically, 250 students expressed interest in the study but only 136 students attended and completed the ACCUPLACER posttest. In addition, students self-selected themselves into either treatment or comparison where 44 chose the treatment and 92 chose the comparison, resulting in uneven sample sizes. Hence, it is difficult to generalize these findings to the general population.

Second caveat--analysis limitations. The analysis did not explicitly control for prior differences between the treatment and comparison groups. This is especially important in this study since students self-selected into treatment and comparison groups and there would be important covariates that would differentiate between students who self-selected into treatment versus comparison, and this could have had an effect on the gain scores. In addition, the analysis only used gain scores to study the effect of MyFoundationsLab Math Boost-Up versus MyFoundationsLab online only. Gain scores do not address regression to the mean. Hence, we are not able to discern the effect of MyFoundationsLab Math Boost-Up program per se and the study could only speak to the association between MyFoundationsLab Math Boost-Up and increases in ACCUPLACER scores.

In conclusion, the finding from this study *does not imply causality* due to the caveats associated with the study. However, it is meaningful to state that there is an association between the use of MyFoundationsLab Math Boost-up (as opposed to just using MyFoundationsLab online only) and increases in the ACCUPLACER test scores.

Future Research Plans

Overview of Future Research Plans

To broaden the body of evidence on the impact of MyFoundationsLab, researchers at Pearson are conducting two quasi-experimental studies. The first study is designed to assess the impact of MyFoundationsLab on the academic achievement and progression of students enrolled in 33 community colleges. Pearson has commissioned researchers at University of Michigan and the University of Texas-Dallas to complete secondary analysis of existing data that will allow them to compare the academic achievement and progression of students that used MyFoundationsLab with that of comparable students that did not use MyFoundationsLab. The second study investigates the extent to which use of MyFoundationsLab in a community college that serves predominantly minority students may help these students progress to credit-bearing courses. In addition, a third party quasi-experimental study has been commissioned by the Joyce Foundation to evaluate the effectiveness of their adult basic education initiatives in which MyFoundationsLab is being used. The Joyce Foundation study is being conducted by SRI International and Pearson will request permission from the Joyce Foundation to receive the completed reports from SRI International. A fourth quasi-experimental study is being conducted by faculty at Coppin State University on the effect of the use of MyFoundationsLab on 8th and 10th graders' college readiness.

Future Research Plans

Quasi-experimental Study Using Regression Discontinuity and Propensity Score Matching	
Intended Start Date	Spring 2016
Anticipated Length of Study	1 year
Type of Study	QED - regression discontinuity and propensity score matching
Research Leads	Stephen DesJardin (University of Michigan) and Rodney Andrews (University of Texas - Dallas)
Intended Sample Size	Over 1 million students enrolled in 33 community colleges
Description of Sample	Sample will be drawn from the Pearson MyFoundationsLab platform and the State Longitudinal Education Data maintained at the University of Texas, Dallas, Education Research Center that contains information about the characteristics and academic achievement and progression of students enrolled at 33 community colleges in Texas.
Outcomes to be Measured	The outcomes to be assessed in this study include: 1. achievement in pre-college math and reading skills,

	2. progression to the first credit-bearing math course,
	3. progression to the first credit-bearing reading course,
	4. retention and graduation from community college.

Proposed Study Description

The Pearson Efficacy,Research and Impact Evaluation team has commissioned faculty at the University of Michigan and the University of Texas to complete a quasi-experimental study using regression discontinuity and propensity score matching techniques to investigate differences in outcomes between students who were users of MyFoundationsLab (treatment group) and those that did not use MyFoundationsLab courses (comparison group). This study will rely on analysis of existing data from Pearson's MyFoundationsLab platform combined with State Longitudinal Education Data maintained at the University of Texas, Dallas, Education Research Center that is related to the educational trajectories of Texas students. More specifically, Pearson has accumulated a unique log of learning activity data from about 1.89 million Texas students who have enrolled in online developmental math programs since January 2007. In addition, community colleges in Texas also use Pearson's MyFoundationsLab for assessing and remediating college and career readiness skills in reading, writing and mathematics. Combining Pearson data about learning activities with the individual student level higher education data housed in the University of Texas, Dallas' Education Research Center , along with additional information provided by community college districts, we intend to determine the effectiveness of MyFoundationsLab used in 33 Texas community colleges and will examine which components of the MyFoundationsLab contributes most to academic success and credential attainment.

Case-Control Study of MyFoundationsLab

Intended Start Date	Q4, 2015
Anticipated Length of Study	2 years
Type of Study	QED - case-control
Research Leads	Carmen Arroyo, Christine Leow and Lauren Gill, Pearson
Intended Sample Size	72 students, two instructors, four classes
Description of Sample	Students are enrolled in a preparatory math course in the Adult Education and Diversity Program at Cerritos College taught by two instructors.
Outcomes to be Measured	The specific outcome examined is progression to credit-bearing math course.

Proposed Study Description

Researchers in the Pearson Efficacy,Research and Impact Evaluation team are conducting a case-control quasi-experimental study in collaboration with the Pearson North America Customer Experience and Engagement Team and instructors at two institutions where MyFoundationsLab is used. The goal of this study is to isolate the contribution of MyFoundationsLab to student success when all other factors that research has indicated are important predictors of student success are taken into account and are statistically

controlled. Specifically, this two-year longitudinal study will take into account factors that impact students' academic achievement and progression and can differentiate students who succeed from those who fail to achieve and progress. Such factors include: students' prior academic experiences, their overall approach to academic work, out-of-school responsibilities, the type and intensity of academic advising students receive when they enroll in college, and the support they receive within their developmental courses.

Additional Quasi-Experimental Study for MyFoundationsLab from Joyce Foundation/SRI International

Intended Start Date	Report available from SRI International in fall 2016
Anticipated Length of Study	Report available from SRI International in fall 2016
Type of Study	QED
Research Leads	Joyce Foundation and SRI International
Intended Sample Size	Approximately 200 students
Description of Sample	Two community colleges are in the study, which will provide some limited generalizability.
Outcomes to be Measured	The outcomes are reading and writing skills of adult learners enrolled in adult education programs.

Proposed Study Description
In addition to studies supported by Pearson, the Joyce Foundation has commissioned SRI International to evaluate programs focused on improving the reading and writing skills of adult learners enrolled in adult education programs who use Pearson courseware products. As part of this effort, SRI International is conducting a quasi-experimental study investigating the efficacy of MyFoundationsLab at two community college-based adult education programs. The initial results from this study will be available in fall 2016. Pearson plans to contact the Joyce Foundation for access to the MyFoundationsLab results from SRI International to be used in our annual report.

Quasi-experimental Study on Early Intervention in Baltimore City Public School with Coppin State Faculty

Intended Start Date	fall 2015
Anticipated Length of Study	1 academic school year
Type of Study	QED
Research Leads	Coppin State faculty and Lauren Gill and Christen Leow, PhD; Pearson
Intended Sample Size	Approximately 190 treatment students from 3 schools and 190 comparison students from 2 schools

Description of Sample	All 5 schools in the study are in Baltimore, 2 of which are managed by Coppin State University and 3 are Baltimore City Public Schools. The students are either 8th or 10th graders.
Outcomes to be Measured	Pre and post diagnostic instruments within MyFoundationsLab will be used to measure students' deficits and subsequent skill mastery.

Proposed Study Description

This study is a collaboration between Coppin State University faculty and Pearson. Its purpose is to determine if MyFoundationsLab will improve student's mathematics and reading scores for a group of 8th and 10th graders so that these college-bound students may enter university pursuing college-level courses in mathematics and English without remediation. Participants were selected from five schools, two of which are charter schools managed by Coppin State University and three schools are in the Baltimore City Public School System - specifically, two schools are PreK-8, two schools are high schools and one school is a middle high school.

The study used a pre-and-post comparison group design. Student and instructor surveys have been administered at the beginning of the school year in fall 2015 and they will be administered again at the end of the school year.

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