Efficacy Report

# REVEL

## March 24, 2016

# Product Summary

REVEL® is an interactive learning environment that enables students to read, practice, and study in one continuous experience. REVEL includes embedded assessments, interactive components, and videos integrated within the narrative content to reinforce key concepts. It also includes familiar learning and study tools such as highlighting, note taking and a glossary to support learning. REVEL provides an assignment calendar that allows instructors to indicate when readings must be completed and a detailed schedule of assignments, with reminders and study tips to help students stay on track throughout the course.

The engaging content and tools within REVEL are designed to transform students into self-initiated, independent learners. It is designed to function on any device, anywhere and anytime so that students may come to class better prepared to learn. By increasing the likelihood that students will complete reading assignments prior to class time, REVEL is intended to make a measureable impact on defined learner outcomes related to educational access, completion, competence, and progression.

# Intended Outcomes

## Overview of Intended Outcomes

When REVEL is implemented as intended, access to learning is expected to increase as a result of the product's modality and learners' likelihood of attending class. Additionally, learners are expected to realize positive outcomes such as increased engagement, higher rates of course completion, and higher academic achievement.

**Intended Outcome 1: Learners can access their learning anytime, anywhere**
As an interactive experience that is designed to be used as an 'anytime, anywhere' learning tool, it is expected that teachers would adopt REVEL to support student reading comprehension and preparedness for class. REVEL is accessible on a variety of devices including computers, laptops, tablets, and smartphones which increases learners' ability to access REVEL content.

**Intended Outcome 2: Learners have a positive learning experience**
REVEL is designed to enhance learning comprehension and is developed with the tools in place to engage learners and offer them a positive learning experience. For example, the interactive nature of the product promotes depth of understanding and lets students frequently check their understanding and receive immediate feedback, which is one of the most effective means for building long-term memory retention and increasing student confidence and motivation, all leading to a more positive learning experience.

**Intended Outcome 3: More learners attend class when using REVEL**
Using REVEL contributes to learning comprehension and preparedness for class discussion. As a result of having a better understanding of the assigned material, it is expected that students will be more likely to attend class.

**Intended Outcome 4: Learners are engaged**
It is expected that the design of REVEL and the tools included in the product will engage students while they are preparing for class. It is also expected that students will be engaged in class through inquiry and discussion because they will attend class better prepared as a result of using REVEL.

**Intended Outcome 5: Learners complete the course the first time**
Students coming to class having read and comprehended the material are expected to be better prepared to master the course content and achieve stronger academic outcomes. As a result, students will be more likely to complete the course in one attempt.

**Intended Outcome 6: Learners are better prepared for classes and discussions**
Within REVEL content has been created and presented in accordance with learning principles that are expected to support depth of comprehension and understanding. The interactive assignments and tools embedded in REVEL are also expected to optimize students' interest in and attention to the narrative content and to build positive learning behaviors. As a result,

students will come to class more prepared to participate in class and in discussions with faculty and peers.

**Intended Outcome 7: Learners pass the course**
Students coming to class having read and comprehended the material are expected to be better prepared to master the course content and achieve stronger academic outcomes.  As a result, students will be more likely to pass the course.

# Foundational Research

## Overview of Foundational Research

REVEL leverages the best in instructional research and design. Every aspect of REVEL was created to reduce extraneous cognitive load and increase long-term memory for students. This enables students to come to class better prepared with the aim to increase their participation in class discussion and to perform better in assessments and in the course overall.

## The design of REVEL is underpinned by several learning design principles:

### Reduction in cognitive load
In cognitive psychology, cognitive load refers to the total amount of mental effort being used in working memory. This includes extraneous cognitive load (mental effort spent on distracting elements that are not relevant to the learning). Research shows that if you can reduce extraneous cognitive load for students when they are reading or studying, you can improve the effectiveness of the learner's ability to process the important information and move it from working memory to long-term memory, (Sweller, 1988, Miller, 1956). Put simply, if you remove distractions, learning is more likely to occur and students are more likely to achieve their desired outcomes.

### Presentation of content
With REVEL, Pearson authors and learning designers have been able to reimagine the way students access the content and learn concepts, applying new learning and assessment strategies that were not possible in the past with a printed textbook, following research-based multimedia learning principles (Mayer & Moreno, 2003). For example, all content in REVEL courses are segmented into a consistent structure. Each chapter (or lesson) is composed of an introduction, content segments, and a summary, which support the learner to structure their thinking. Learning objectives help organize the content and help the learner to focus on important concepts. Even elements such as fonts, color palette, column width and the amount of white space a student sees on the screen have all been selected to reduce the extraneous cognitive load on students while reading the REVEL course content.

### Embedded interactives and media
REVEL is designed so that narrative text is combined with interactive elements in order to improve learning. Information and ideas can often be presented more clearly via interactive content (or media) than via static text alone. The value of active pauses lies in the opportunity for learners to stop and process information more deeply, connecting the media to the text and building a richer knowledge base (Craik & Tulving, 1975; Mayer, 2002).

### Embedded assessment
REVEL's approach to embedded assessments aims to positively impact both learning and instruction. REVEL lets students frequently check their understanding and receive immediate feedback, which is one of the most effective means for building long-term retention and increasing student confidence and motivation (Hattie 2009, 2012). The spacing of assessment opportunities reflects research on optimizing memory (e.g. Clark & Bjork, 2014). REVEL

assessments also allow instructors to gauge student comprehension frequently, provide timely feedback, and address learning gaps along the way. In addition, the assessments in REVEL are low stakes (students earn credit for correct answers) which communicates the value in completing assignments.

# Intended Product Implementation

## Overview of Intended Product Implementation

REVEL launched in September 2014 and therefore is in early stage development for a product of this type. However, preliminary data about its implementation in the classroom has been gathered. Throughout 2015 we have collected information about how instructors implement REVEL in their classrooms, how content is used by instructors and students, experiences of students accessing the technology system with respect to product access, implementation, and student engagement. Future studies will include more controls within the study design to deepen the insights from the data collected.

In a study (see details in next section) of the implementation of REVEL, the majority of instructors (67%) indicated that they assigned reading in REVEL at least one week before the topic was going to be covered in class and required that the short quiz embedded within REVEL be completed prior to coming to class that day. Students' scores on quiz items are then used by instructors to design his/her lecture to focus on identified gaps in knowledge. Instructors also reported that they assign the end-of-section quizzes to help students reflect on their reading. Future research will be designed to further explore the different ways in which the product is being implemented by educators.

# Product Research

## Overview of Product Research

At this time we have strong foundational research which suggests that REVEL was designed and developed in alignment with best instructional practices. We also have preliminary evidence demonstrating how instructors are implementing REVEL, how students are using the product, and how students perceive the use of the product. We have early evidence of how intended use of the product relates to the identified outcomes. Based on early findings we have developed plans for future research that is expected to provide more rigorous evidence of the efficacy of REVEL. The planned studies will evaluate the impact of features that have been added to REVEL since the current research was conducted.

## Research Studies

| *A Study of the Implementation of REVEL in Undergraduate Humanities and Social Science Courses* | |
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| Study Citation | *A Study of the Implementation of REVEL in Undergraduate Humanities and Social Science Courses* (2015), Pearson Education, Higher Education Line of Business, Efficacy and Research |
| Research Study Contributors | Higher Education Line of Business, Efficacy and Research |
| Type of Study | Descriptive and correlational |
| Sample Size | 735 students in pre-semester survey sample; 483 students in post-semester sample; 193 students with linked pre- and post-semester surveys; 15 instructors, REVEL platform usage data from 10,497 unique student users. |
| Description of Sample | Though it was suggested that all instructors and students who used REVEL participate in the data collection efforts presented in this report, completion of student surveys was not mandatory and, therefore, the sample may not be representative of the population of students using REVEL. |
| Outcomes Measured | Learners can access their learning anytime anywhere. Learners have a positive learning experience. Learners are engaged. Learners are better prepared for class discussion and activities. |

## Introduction

REVEL was launched to market in the Fall of 2014 with nine pilot titles, across the disciplines of psychology, sociology and US history. There are now 88 titles live in REVEL and available across humanities and social science. Through 2016, more functionality will be added to REVEL to meet the needs of additional users alongside an evolution of the content design.

This study was completed with a sample of instructors and students using REVEL in the spring of 2015. The primary goal of this exploratory study was to gather information about how REVEL was implemented in order to improve the product and guidance on implementation of the product that is provided to instructors. The second goal of the study was to explore, through pre-post and correlational analysis, whether use of REVEL has the potential to relate to learner outcomes in the way envisioned for the product. Although the study complies with the standards for rigorous case study methodology, causal claims are beyond the scope of the study.

## Methods

This implementation study used a case study methodology (Yin, 2014) whereby data was collected using multiple methods in order to provide triangulation of data. Data sources included (a) interviews with faculty to understand their reasons for using REVEL and how they implemented the product; (b) standardized surveys completed by 15 faculty in order to collect equivalent data about implementation and perceptions about the impact of REVEL on instruction and student learning, the benefits and challenges associated with the use of REVEL, and recommendations for improving REVEL; (c) REVEL platform data was extracted from the REVEL platform for all courses and, (d) pre- and post-semester surveys of students designed to gather information about their demographic characteristics, prior use of technology -based homework completion systems, prior course-taking patterns in the content area in which REVEL was used, student expectations about what they would be able to accomplish while using REVEL, perceptions of their own abilities related to classroom tasks that REVEL was designed to support, and their perceptions of the impact of REVEL on their learning.

## Sample

Of the 15 instructors who completed the survey, seven (47%) taught at a four-year institution and eight (53%) taught at a two-year institution. The majority of instructors (67%) had taught the course in which they implemented REVEL 10 or more times prior to the spring 2015 semester. Six instructors participated in interviews conducted at the end of the course.

In total 735 students completed the pre-survey and consented to be part of our study. At the end of the spring 2015 semester all students were again asked to complete a survey that gathered information about their experiences accessing and using REVEL, classroom practices, study habits, perceived ability, activities students engage in outside of the classroom, and comfort with technology. Of the original 735 students who completed the pre-survey, 483 students completed the post-survey (66%).

As we wanted to allow students to maintain their anonymity while completing the survey they were not required to provide their names or student identification numbers.Instead, we requested that they enter their email address. Email addresses were used to link pre-survey data to post-survey data so that we could measure changes in self-reported study behaviors and skills from the beginning of the course to the end of the course. Given that students were

not required to provide an email address (and some students may have provided different email addresses on the pre- and post-survey) we were only able to match pre-surveys with corresponding post-surveys for 26% of students. Again, while this match rate is low, the data lends itself well to the exploratory nature of this study.

Among the 735 students who completed the pre-survey, the majority (70%) reported they were female while 29% indicated male. The majority of students in the study (70%) were enrolled in college full-time. 65% graduated high school between 2010 and 2014, implying that the majority of REVEL users in this study were between the age of 18 and 24.

**Results**

Implementation findings from instructor surveys and interview. It was important for Pearson that we understand why instructors had decided to implement the product in their classrooms and whether the reasons for implementation varied by institution type. Overwhelmingly, the majority of instructors across both two and four-year institutions (73%) reported that at least one of the reasons that they decided to implement REVEL was to make sure that students were better prepared for class by completing their reading assignments prior to coming to class. One teacher at a four-year institution noted,

*"My main goal was to get students to read the textbook material to be better prepared for discussions and exams".*

Instructors at two-year institutions noted that their adoption was driven by the availability of quizzes within REVEL that provided accountability to ensure that students came to class having read the assigned material. For example, one instructor from a two-year institution reported,

*"The online based quizzes tipped the scale. Previously, the only way to ensure [that] students completed the reading was to administer in-class quizzes. That was time consuming. REVEL's online quizzes alleviate that. I can ensure that students read and complete quizzes prior to coming to class."*

One open response item on the instructor survey asked teachers to indicate how REVEL has impacted how they teach the course. Responses to this item were coded and themes emerged across teachers from both two and four-year institutions. Of the 15 instructors who responded to the survey, one-third (five instructors) indicated that their instructional approaches within the course had not been altered by the adoption of REVEL. However, several (six) of these instructors noticed changes within their classrooms due to students' use of REVEL.

*"REVEL has not significantly changed how I teach this course, although the students appear to have (at least at first) gotten more out of the reading, as a result of using REVEL."*

*"I didn't change anything about the way I taught my course other than making the reading quizzes worth extra credit points. I have always assigned readings, but had no way of monitoring if students completed the readings other than through exam/quiz performances."*

REVEL usage patterns identified in platform data. To better understand how students spent their time in REVEL and to confirm whether REVEL was being used in ways that were consistent with the reports provided by the sample of instructors, we analyzed all student interaction data available within the platform for all courses that used the same content and textbook title as that used by the instructors. Our analysis focused on the following indicators of use: content

coverage (sections covered in the book title); problems assigned (usage by instructors) and solved (usage by students) within each section; number of students involved in problem solving within each section; and time spent on each section. Data for these analyses came from the 10,497 students enrolled in courses that used the same coursebooks as those used by the teachers who participated in our study. Overall, analysis of platform data verified instructors' responses in surveys where they indicated that they often assigned chapter quizzes to check student understanding of content and then assigned additional assessments post-lecture. Instructors assign the 20-item chapter quizzes and then appear to assign follow-up assessment items to check student understanding. An example visualization of usage patterns from these analyses is presented below in Figure 1.

**Figure 1. Number of unique problems assigned and solved within each content unit with the number of unique users represented in circle size.**



Psychology, 4e (Ciccarelli & White)
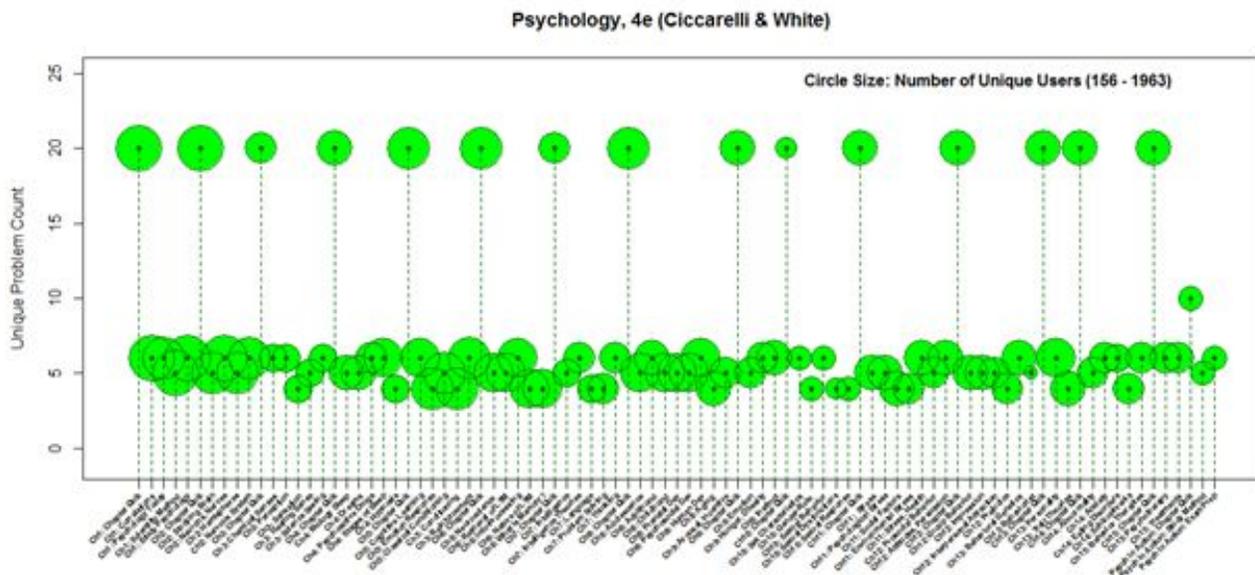
**Findings related to student access and experience.** This implementation study included data from 483 students who provided responses to a post-semester survey designed to collect information about their experiences using REVEL. In total 82% of students reported they were able to use REVEL on the first week of class and only 5% of these learners experienced problems using REVEL, while 46% reported that they never used the backup print textbook because everything they needed was available within REVEL. Only 6% of students reported that they experienced challenges throughout the semester when they were trying to access REVEL. Such findings suggest that students are able to access REVEL without difficulty.

**Pre-implementation to post-implementation changes in students.** The ultimate objective of adopting any goal of REVEL is to support students' adoption of positive learning behaviors that will allow them to master course content. To that end it is important to take a systematic first look at how students are perceiving the use of REVEL. Using data collected in the student pre- and post-surveys, analysis was conducted to uncover preliminary information about the potential

impact of the use of REVEL on student classroom practices, perceived ability, and comfort with technology. While many of these are not the long-term outcomes we strive to achieve among students, these can serve as important mediators of moderators of student achievement, completion and progression. Data collected from 193 students who provided responses to both pre- and post-semester surveys were used in these analyses.

The majority of the questions used in the student pre- and post-survey are drawn from the National Survey of Student Engagement (NSSE). Over 1,700 institutions and over five million students have completed these surveys since 2000 and all the questions from the surveys have been shown to be valid and reliable. Specifically, for this study, NSSE designed to capture information about students' prior education experiences, first generation status, college expectations, time spent on academic activities and in fulfilling other work and family obligations were incorporated into the surveys used in this study to ensure that we used questions that had already been tested for validity and reliability, and so could be easily understood and were appropriate for use with students enrolled in both four-year and two-year institutions.

Parallel questions on the student pre- and the post-survey asked respondents to indicate how often they engaged in important classroom practices that were associated with the outcomes that REVEL was expected to support. Six questions on the surveys asked students to select between 'never', 'sometimes', 'often', and 'very often' as they pertained to engaging in classroom practices such as preparing for class and collaborating with other students in the classroom. Chi-squared tests of significance were run to examine whether the difference in the distribution of responses was statistically significantly different from the pre-survey to the post-survey for the 193 students whose responses we could match. During the post-survey, after having used REVEL, students were more likely to report that they sometimes or often asked questions or participated in class ($X^2(9,191) = 43.47$, $p<.001$), less likely to report that they often or sometimes attended class without having completed assignments ($X^2(9, N = 192) = 34.96$, $p<.001$), they were less likely to ask other students for help ($X^2(9, 191) = 54.48$, $p<.001$) and also less likely to give other students help ($X^2(9, 191) = 54.48$, $p<.001$).

Among this group of respondents, there were significant pre- (M=4.12, SD=1.31) and post-REVEL (M= 4.37, SD = 1.31) use changes in students' perceptions of their abilities to "give oral presentations that are clear, informative and persuasive" ( t(190) = 3.40, p < .01) and to "learn effectively on (their) own" ($M_{pre}$=4.83, SD=1.19, $M_{post}$=5.09, SD=1.07; t(191)=3.29, p<.01). There were also significant increases in students' ratings of their comfort level in using technology from pre- (M=8.44, SD=1.87) to post-REVEL (M=8.94, SD=1.53)  (t(192)=4.42, p < .01).

**Discussion**
This study does not allow for causal claims but it represents the appropriate level of analysis to generate information for product improvements and to confirm that the hypothesized learner outcomes are feasible and should be tested more rigorously in the next phase of efficacy testing.

Although 735 students completed the pre-semester survey, post-semester surveys were completed by only 483 students. Furthermore, due to inconsistencies in the information that was used to link pre-semester and post-semester surveys, data that allows for analysis of changes in student motivations and perceptions of their abilities was only obtained for 193 students. Thus, the study is limited by high levels of attrition.

The strength of this study lies in the fact that it uses valid methods for conducting implementation case studies, as defined by the academic community (Yin, 2014) and serves as a good example of how Pearson uses appropriate impact evaluation approaches throughout the product development cycle to inform product development, enhancements, and implementation.

# Future Research Plans

## Overview of Future Research Plans

An initial study focused on exploring the implementation of REVEL and provided information about the ways that REVEL is used by students and how the platform captures data related to students' performance. Analysis of pre- and post-semester surveys completed by learners provided preliminary evidence that use of REVEL may be associated with increases in learner outcomes. Information from the initial study will inform guidance provided to instructors about how to best implement REVEL for successful outcomes and is also leading to improvements in the data capturing capabilities of REVEL, which will provide more substantial evidence of impact on outcomes going forward.

Additional features have been added to REVEL since it was first launched in fall 2014. For example, during the fall of 2015, features supporting writing activities were fully launched with a goal to help develop critical thinking skills among learners. Given the evolving nature of this new product, during 2016, additional studies will be completed to identify how these features are used and which modes of implementation are associated with the highest levels of positive learner outcomes related to access, experience and achievement. We will also model the relationship between engagement with REVEL and various learner outcomes. By the end of 2016, customers will be recruited to participate in a quasi experimental study that will be implemented by spring 2017 to investigate whether students using REVEL have higher achievement and completion outcomes than similar students that do not use REVEL

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