A Platform for Integrating and Analyzing Data to Evaluate the Impacts of Educational Technologies

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ABSTRACT

Educational technology (edtech) products are ubiquitous in schools, but a paucity of research has evaluated their impact on education outcomes. Herein we describe a platform (i.e., LearnPlatform) that enables users to integrate and analyze data to rigorously evaluate the impacts of edtech. The platform also enables users to mine large and diverse datasets to identify patterns and trends in edtech usage and impact, and to build statistical models through predictive analytics that use multiple predictors to forecast future events, trends, and probabilities. Ultimately, educators and researchers can use LearnPlatform to generate evidence-based insights about edtech ecosystems within and across schools, districts, and states, which will improve the discovery, purchasing, and evaluation of edtech products in myriad educational contexts.

Keywords

Educational technology, efficacy, data, evaluation, education outcomes

1. INTRODUCTION

Educational technology (edtech) is increasingly pervasive. Each year, billions of dollars are spent and innumerous products are released. Despite immense resources invested, there has not been a standard system for monitoring and evaluating the use, quality, and efficacy of edtech products, leaving school leaders without access to critical data when making instructional, operational, and fiscal decisions. These decision makers need timely, reliable, evidence-based information on edtech interventions to know what to buy, how to support instruction and implementation, and how to improve student outcomes. Accordingly, Lea(R)n, Inc. worked with thousands of educators, state and district leaders, subject matter experts, and researchers to develop an online edtech management platform, called LearnPlatform, to help education organizations and institutions understand and manage which edtech products are best for their needs.

2. EDTECH MANAGEMENT PLATFORM

LearnPlatform is an edtech management platform that helps schools and districts understand which edtech products are best for their classrooms and students. To ensure valuable and trustworthy insights, the platform was built to support sound research methods and study designs[1] that enable systematic investigations within authentic educational contexts. The platform offers a research-based system for educators to understand, manage, and evaluate edtech products. Among other things, the platform allows users to (a) identify, catalogue, and monitor the products that are being used in their classrooms; (b) grade products on a valid and reliable rubric;[2] (c) connect with colleagues to share insights and ask questions; and, (d) conduct edtech evaluations that range from rapid-cycle pilots to randomized control studies (RCTs) to multi-product factorial studies. The analytics module of the platform, called LearnTrials IMPACT (*Integrating Metrics for Producing Analytics on Classroom Technology*), allows users to rapidly integrate disparate datasets and analyze those data to generate evidence-based insights on edtech interventions.

3. ANALYTICS MODULE

The platform's analytics module (LearnTrials IMPACT) has several noteworthy components. First, the platform maintains and continuously updates a relational database with over 4,000 edtech products that are available to educators (see Figure 1).[3]
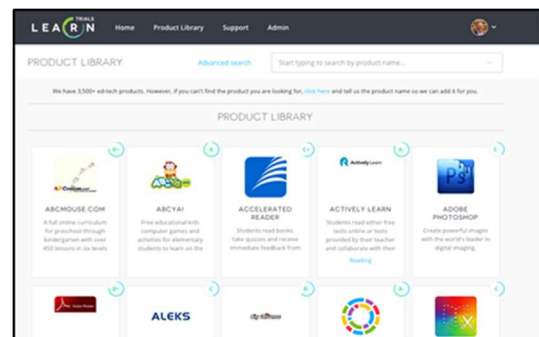

Figure 1. Screenshot of product library with product grades.

Second, a structured architecture allows educators to leverage useful features, including managing portfolios of products, sharing experiences with tools, asking colleagues questions, viewing products' grade reports, and comparing products side by side (see Figure 2 for example of an administrator view).

Third, capabilities of the platform allow districts to collect rapid feedback on the products they already use, launch evaluations of products, and analyze findings filtered by dozens of criteria (e.g., purpose of product use, frequency of use, student groups with which the product is used; see Figure 3).
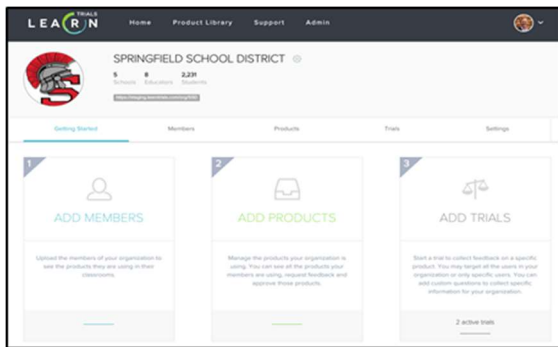
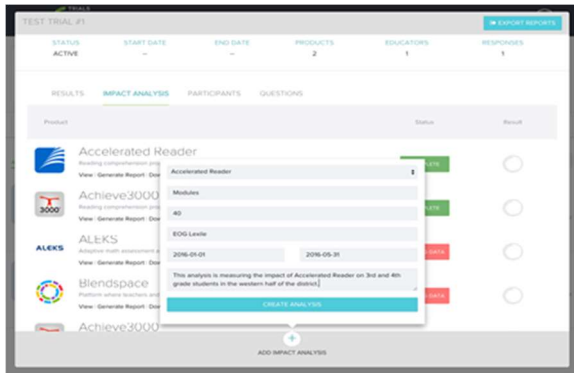*Figure 2*. Administrator view of LearnPlatform.

Figure 3. Screenshot of functionality in the IMPACT layer.

Fourth, the platform aggregates educators' evaluations of products into interpretable and actionable recommendations about the product and its optimal use with various student populations. Finally, a data integration and automated analytics layer allows users to rapidly de-identify, upload, and analyze product usage (e.g., time on system, modules completed), student outcomes (e.g., achievement, motivation, engagement), and other data to produce dynamic reports and dashboards that inform instructional, operational, and budgetary decisions (see Figure 4 for example of Impact Analysis Report with simulated data and a fake product).

4. CASE STUDY

Schools, districts, and states across the US are using LearnPlatform. One of the nation's largest school districts leveraged LearnPlatform to conduct a controlled trial with a quasi-experimental design that generated insights for budgeting and implementation. In the efficacy trial, the district studied a widely used edtech product for elementary literacy. The sample included 18 schools who used the product (treatment group; n_T > 8,000) and 18 schools who did not use the product (control group; n_C > 8000). We tested for baseline equivalence on multiple measures, including demographics and prior achievement. We also applied statistical adjustments to control for variance attributable to extraneous factors and covariates. We first computed covariate-adjusted effect sizes to determine the extent to which the product exhibited an impact on the treatment versus the control, then conducted cluster analysis to identify student clusters of product usage and examined achievement for different clusters. Results were confirmed through a separate, blind analysis by the district's data and accountability office. Additional analysis of costs informed the district's purchasing and budgeting decisions.
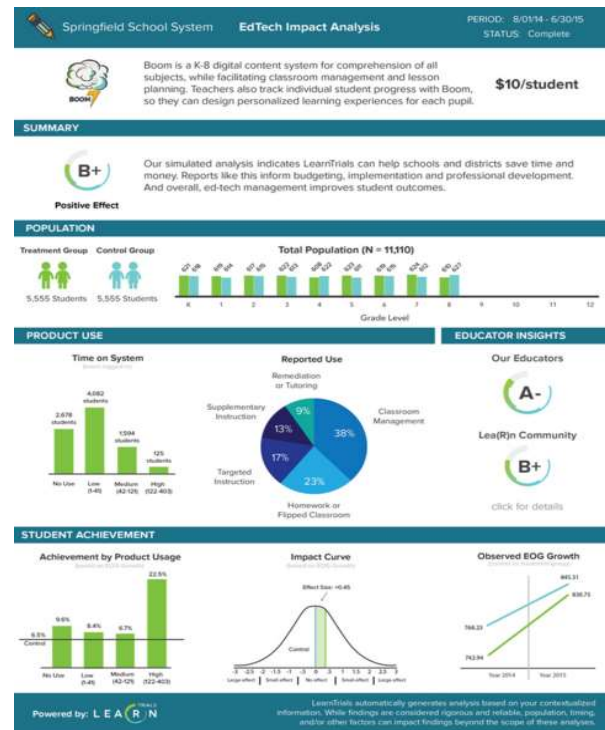

Figure 4. Example of an impact report (fake product and school).

5. FUTURE DIRECTIONS

First, LearnPlatform will enable users to mine datasets to identify patterns and trends in edtech usage and impact, and to build statistical models through predictive analytics that forecast future events, trends, and probabilities. Second, once enough data are available, users will be able to leverage LearnPlatform to conduct meta-analyses to begin to elucidate conditional and contextual effects that may differentiate the efficacy of a given intervention based on factors that vary across schools, districts, or states. Ultimately, educators and researchers will use LearnPlatform to gain data-driven insights into edtech ecosystems across schools, districts, and states, and to improve discovery, purchasing, and evaluation of what works for educators and their organizations.

6. ACKNOWLEDGMENTS

7. REFERENCES

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