

Research Spending and the Most Popular Educational Technology Products

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Working Group Description

Of the most popular Educational Technology products/programs in Higher Ed and K-12, how many have been evaluated and by whom? What role did research play in developing these products/programs as opposed to functioning as marketing after the products were already successful? When was efficacy research done in relation to the development of the product, marketing efforts and capturing market share? To what extent was product research conducted prior to the financial viability (of the product) or as part of marketing efforts?

Background

It is not generally known what kinds of research technology developers and consumers undertake or rely on when assessing the usefulness of educational technology products. However, there is evidence that many school districts often rely on pilot tests when making educational technology purchasing decisions (see [Fostering Market Efficiency in K-12 Ed-tech Procurement](#)). Unfortunately, it has also been documented that schools often do not collect enough data in these pilots to make “strongly” informed decisions (see the [UC-Davis](#)

Pilot-to Purchase Project).

There is also some information regarding the kinds of research technology companies make use of when developing and evaluating their products. In 2015 Digital Promise ran a crowdsourcing campaign asking technology developers to share “the what, how, and why of research-based product development” and published their findings in a report entitled Using Research in Ed Tech. The nearly 50 responding companies reported three main ways they engage in research throughout product development, implementation and evaluation:

- *Learning Science*: using scientific research on how people learn to inform product development
- *User Research*: gathering information on how people are interacting with the product
- *Evaluation Research*: determining how a product contributes to solving a problem in education

This report presents additional findings concerning ways that educational technology companies use research in different phases of product development and marketing.

Research Questions and Methodology

Research Questions

1. What kinds of research do developers of popular educational technology products conduct (or commission) to support the development of, and assess the efficacy of, their products?
2. What kinds of research would they like to see or conduct?
3. What outcomes do product developers envision or expect from use of their products?
4. What percentages of product budgets are dedicated to support development and efficacy research?
5. How do developers make use of research when marketing their products?

Company Selection Methodology

This working group’s goal was to explore the role research has played in the development and marketing of the most popular educational technology products and programs. In keeping with this goal, the group sought to survey a sampling of the most popular educational technology products and programs offered in the U.S. K-12 and Higher Education markets. Published lists of popular educational technology companies and online indices of educational technology companies (such as the Ed Surge Product Index, Eduventures Higher Education Technology Landscape, Learning Management Systems lists of extension partners, IMS Global Learning Tools, Tyton Partners 2016 Growth50 winners, and SIAA 2016 Codie award winners) helped to generate an initial list of educational technology categories and companies. We sought to list several products in each category (below) to ensure we covered a broad range of educational technology offerings. Working group members named educational technology products they were familiar with, and searched on the web to fill in the gaps. This generated a list of 242 educational technology companies.

Relatively few educational technology companies are public, so it was rare that we found published revenue, customer, or growth numbers. To identify which educational technology products were the most popular, working group members used information published on companies' own web sites (number of customers, number of students served when available), LinkedIn.com (number of employees, date founded), CrunchBase.com (investment, number of employees, date founded), press releases, product reviews, and product indices such as those named above. The collected information gave the working group a means to compare companies and identify exemplary offerings in each category. Working group members then informally surveyed colleagues and contacts in K-12 and Higher Education to check to see if others agreed with their choices for exemplars. Note: We do not claim to have found the *most* popular products, as this is hard to define, let alone gauge.

Classroom & Productivity	Curriculum & Instruction
<ul style="list-style-type: none"> ○ Classroom capture / lecture tools ○ Classroom efficiency ○ Classroom communities ○ Classroom response ○ Collaboration tools ○ Grading ○ Learning Management Systems ○ Presentation tools ○ Classroom hardware for student use 	<ul style="list-style-type: none"> ○ Accessibility ○ Analytics ○ Badging ○ College and career readiness ○ Course or curriculum authoring tools ○ Resource and lesson repositories ○ Digital courseware and curriculum products ○ e-Portfolios ○ Formative assessment ○ Games and simulations ○ MOOCs, online courses, and virtual learning ○ Online assessment and security management ○ Online tutoring ○ Placement or diagnostic assessment ○ Special needs ○ Student coaching ○ Student study tools ○ Test prep ○ Teacher professional development

Scope:

- Market: technology-based products sold into the U.S. K-12 and Higher education markets

- **Customers:** K-12 schools, districts, and parents; Higher education instructors, departments, institutions, and students
- Productivity tools were excluded if they did not measure or contribute to learning outcomes
- Educational toys and digital storybooks without a specific teaching purpose were excluded
- Digital solutions that offer professional development to educators were included
- Some classroom hardware was included, but most products are software

We then removed offerings from companies that were overrepresented on our list (because they offered products in several categories). In some cases, we selected more than one exemplar due to the overall participation in a particular category (for example, 8 exemplars were selected in the Digital Courseware and Curriculum Products category). This resulted in a list of 44 educational technology companies; 15 offer products in K-12, 19 offer products in Higher Ed, and 10 offer products to both markets. These 44 companies are in the following categories:

Category	Number of Exemplars Selected
Classroom Capture	2
Classroom Communities	1
Classroom Efficiency	1
Classroom Response	1
Collaboration Tools	2
Learning Management Systems	2
Presentation Tools	1
Classroom Hardware for Student Use	2
Accessibility	1
Analytics	2
Badging	1
College and Career Readiness	1
Course or Curriculum Authoring Tools	2
Digital Courseware and Curriculum Products	8
ePortfolios	1
Formative Assessment	1
Games & Simulations	2

MOOCs, Online Courses, and Virtual Learning	3
Online Assessment & Security Management	1
Online Tutoring	1
Placement or Diagnostic Assessment	1
Resource and Lesson Repositories	1
Special Needs	1
Student Coaching	1
Student Study Tools	2
Test Prep	1
Teacher Professional Development	1

Data Collection

Data collection involved a survey followed by individual interviews, as described below.

Survey Development and Administration

Goals of the survey were defined by the working group's stated purpose, and research questions were designed to discover how educational technology companies use and perform research in all stages of product development and go-to-market. The working group contributed questions and collaboratively drafted a survey, as follow:

- Preliminary questions were developed by subset of group
- A list of these preliminary questions was sent to all working group members to review and provide feedback and suggestions
- After receiving feedback the list of survey questions was finalized

The survey was entered into Survey Monkey and distributed via a link through personal emails from working group members to contacts identified at the selected companies.

Respondent Group

Seventeen of 44 contacts responded to the survey, and 14 completed the survey in its entirety (31.8% completion rate), but a few others answered a portion of the survey. Some respondents completed the survey after follow up calls from group members. The respondent group had the following characteristics:

- 8 offerings for the K-12 market
- 3 offerings for the Higher Ed market
- 3 offerings used in both K-12 and Higher Ed

The following categories were represented:

- Classroom hardware for student use (2)
- Digital courseware and curriculum products (7)
- Games & simulations (1)
- MOOCs, Online Courses, and Virtual Learning (1)
- Resource and Lesson repositories (1)
- Student study tools (1)
- Classroom capture (1)

Interviews

We asked those company representatives who completed the survey if they were willing to be interviewed to provide more context to their survey responses. Interview questions were based on survey questions but follow up and probing questions were asked to clarify responses and provide further detail or explanations. We conducted 12 interviews (11 by phone and one in person) were conducted, one of which was with a representative of a company that did not fill out the survey. The interviews lasted approximately 30 to 40 minutes.

Results

Below are responses to a subset of the survey questions. Other survey questions pertained to the nature of the company, the position of the respondent answering the survey, the types of products developed, contact information, etc. Several of the tables below are followed by summaries of related interview responses.

Survey Results: Research Methodologies Product Design, Improvements, and Outcomes

Because more than half of the companies asked to complete the survey did not respond we suspect that the results are biased in favor of those companies that engage in some type of research. Several working group members acknowledged the likelihood that those companies that are engaged in research activity in one or more product phases are more likely to respond to a research survey on product-related research than those that are not. Indeed, during the interviews some company representatives were proud of the types of research they do.

Those companies that responded to our survey reported on their use of different methodologies at different phases of product design, development, and implementation. While all of the respondents reported carrying out some types of research or evidence gathering, some methodologies were more prevalent, as shown in the charts below. The interviews conducted after the survey expanded on and clarified some of these survey results.

In which type of research did your company engage at each stage of your product's development (Select all that apply)?

Expert Review			
	Yes	No	Total
Product Design & Development	86.67% 13	13.33% 2	15
Improving and Updating your Product	85.71% 12	14.29% 2	14
Measuring Outcomes	85.71% 12	14.29% 2	14

Focus Group			
	Yes	No	Total
Product Design & Development	93.33% 14	6.67% 1	15
Improving and Updating your Product	86.67% 13	13.33% 2	15
Measuring Outcomes	50.00% 6	50.00% 6	12

Pilot Study			
	Yes	No	Total
Product Design & Development	86.67% 13	13.33% 2	15
Improving and Updating your Product	64.29% 9	35.71% 5	14
Measuring Outcomes	50.00% 6	50.00% 6	12

Case Study			
	Yes	No	Total
Product Design & Development	56.25% 9	43.75% 7	16
Improving and Updating your Product	71.43% 10	28.57% 4	14
Measuring Outcomes	57.14% 8	42.86% 6	14

Comparison Study (treatment and control groups)			
	Yes	No	Total
Product Design & Development	61.54% 8	38.46% 5	13
Improving and Updating your Product	66.67% 10	33.33% 5	15
Measuring Outcomes	78.57% 11	21.43% 3	14

Controlled Comparison Study (treatment and control groups, controlling multiple variables)			
	Yes	No	Total
Product Design & Development	36.36% 4	63.64% 7	11
Improving and Updating your Product	46.15% 6	53.85% 7	13
Measuring Outcomes	45.45% 5	54.55% 6	11

Randomized Control Trial			
	Yes	No	Total
Product Design & Development	25.00% 3	75.00% 9	12
Improving and Updating your Product	30.77% 4	69.23% 9	13
Measuring Outcomes	46.15% 6	53.85% 7	13

Interviews: Product Development and Improvement

A few company representatives talked about research efforts that are carried out prior to, or at the beginning of their product development. This included research identifying the kinds of products people may want and what kinds of product affordances may facilitate learning. Information garnered by attending conferences, reading technology journals, reading content standards, talking and listening to school personnel, and reading research on learning informs companies designing products. For example, one company representative has looked at early adopters of a technology that they believe is now being explored by some teachers, and another referred to research on the effect of data

visualization and collection on learning when developing their software. In addition, some companies also look at market research before fully committing to product development. One respondent stated, “decisions involve a mix of gut, data and rigor.”

In addition, in early stages of product development companies most run ideas and prototypes by experienced technology users, and by content and technology experts. Then further developed prototypes and beta versions are created and undergo expert review, small pilots in classrooms, and focus groups; one vendor referred to bringing “parents and kids into our lab on Saturdays, with pizza.”

Design researchers conduct usability interviews and focus groups sessions with long time and “power” users, and with teachers for ongoing development. Information gleaned from classroom observations is also fed back to development teams for product revisions. One respondent stated, “we do practical, not academic research.”

Technology platform developers and technology-based service providers that rely on content from authors and products from other vendors “look for products to include that have been shown to be effective through research,” or for “authors who do their own research when developing materials and texts.” Thus, research was conducted, but not directly by them.

Interviews: Product Implementation and Measuring Outcomes

Companies are measuring outcomes, using a variety of methods, with most are not carrying out controlled studies. The above tables displaying the survey results regarding types of research conducted is misleading. For example, the number reporting the use of randomized control trials may not be representative of what is actually being done. In some cases interviewees mentioned that a few such studies were done in the past, others said they are planning for, or even hoping for, RCTs in the future. Most of the respondents interviewed reported that their companies do little to no “formal” research on their product’s efficacy; but some have conducted or employed third party researchers (universities, research outfits, state department of education) to do more controlled research, but overall there is little being done with formal controlled comparisons and RCTs. Given that most selected companies did not complete the survey, there may be even less formal research done across all developers.

The reasons given by most respondents for the doing little formal and large-scale research were similar. Respondents said that formal research takes too much time, especially when “technology is moving fast,” it’s expensive to undertake, it takes staff times and resources, and there are too many variables to control. They stated in various ways, that the success of a product depends on numerous factors such as the actual product implementation, the teachers’ preparation, the students’ academic backgrounds and actions, the curriculum used, the types of assessments used, as well as other factors. Some quotes from

representatives from three very successful companies are: “Success is on the school district, not the vendor, the vendor is part of whole” and “We do not want to go through a fishing expedition with great expense and it may show [our product] doesn’t work; it’s too risky for reasons not due to our product...we do not need to rely on RCTs.” Another said “we leave that to others...schools, university faculty and students doing dissertations, we will loan them products for that.”

However, there are companies (including the three mentioned above) who see the value in formal research and several are doing or planning more formal research (see Future section below). For example, one company is currently partnering with a research firm “to do formal research with controls; looking at state test scores and growth scores. Another mentioned a current “multi-year efficacy study by university, tracking growth in 3 cities.” And, at the Symposium, one product developer informed us of an RCT study that showed positive results from use of his product.

Most companies are doing research in the form of expert reviews, small-scale pilot studies, case studies (usually school based), and focus groups. Some of this is in actual classrooms, while some of it is done in company labs and other spaces. These companies rely on small one or two-group studies (some with pre-post assessments), observations, teacher reports, continual user feedback, user journals, field notes, videos, and student stories and creations. A few company representatives said that there are school districts that prefer case studies because they show how a product was actually implemented in classroom and how teachers and students responded. In addition, some school districts are doing their own efficacy research, with data supplied back from the companies or embedded assessments. Some companies track student growth before, throughout and after implementation by means of internal analysis of embedded assessments.

Several respondents stated that small-scale studies are better when one wants to control or check on the actual content taught and how the product was implemented in order to best understand “all of the mechanisms at work.” These representatives are most interested in better understanding “the conditions under which, and the teaching strategies” that lead to the best outcomes, because “products can have tremendous results in one classroom and no results in another.” A number of respondents believe that “implementation models are one of the biggest driving factors of success.” Note that not all of these small-scale studies are very small - one vendor mentioned a “small” study involving hundreds of students using their products.

Sources of Research

Two questions referred to the sources of research connected with product development and implementation. Taken by themselves, these numerical results can be difficult to interpret accurately. The interview results reported in the sections in this report labeled Product Development and Improvement, Product

Implementation and Measuring Outcomes, Outcomes, and Marketing are useful in giving the context of these responses.

How did your company obtain research at each stage of your product's lifecycle (select all that apply)?

Access existing learning science or other relevant research			
	Yes	No	Total
Product Design & Development	100.00% 15	0.00% 0	15
Improving and Updating your Product	92.86% 13	7.14% 1	14
Measuring Outcomes	78.57% 11	21.43% 3	14
Sales & Marketing	78.57% 11	21.43% 3	14

Commission consultants to conduct research			
	Yes	No	Total
Product Design & Development	53.85% 7	46.15% 6	13
Improving and Updating your Product	46.15% 6	53.85% 7	13
Measuring Outcomes	61.54% 8	38.46% 5	13
Sales & Marketing	53.85% 7	46.15% 6	13

Conduct your own research			
	Yes	No	Total
Product Design & Development	100.00% 14	0.00% 0	14
Improving and Updating your Product	100.00% 15	0.00% 0	15
Measuring Outcomes	80.00% 12	20.00% 3	15
Sales & Marketing	86.67% 13	13.33% 2	15

Research Budgets

The charts below show how much was budgeted for product design and outcome research.

What proportion of your entire product budget is dedicated to research on design, development, improvement, and updating?

Answer Choices	Responses	16
Less than 1%	12.50%	2
1% to 5%	37.50%	6
6% to 15%	6.25%	1
16 to 30%	12.50%	2
31% to 50%	18.75%	3
more than 50%	6.25%	1
I'm not sure	6.25%	1

What proportion of your entire budget is dedicated to research on outcomes measurement?

Answer Choices	Responses	16
Less than 1%	25.00%	4
1% to 5%	31.25%	5
6% to 15%	31.25%	5
16 to 30%	0.00%	0
31% to 50%	0.00%	0
more than 50%	0.00%	0
I'm not sure	12.50%	2

One can see from the tables above that responding companies spend only a small portion of their products overall budgets on research and that a higher percentage is spent on product design and development. This is not surprising given the costs of developing technological products and the level of research activity reported.

Outcomes

Company representatives were asked about the kinds of outcomes they would want to see measure after appropriate implementation of their products. Again, refer to the interview summaries to get a better idea of what kinds of outcomes are desired by developers.

The following are types of outcomes your company could measure. Select the outcomes that you measure for your product or products

Answer Choices	Responses	
Conceptual understanding	60.00%	9
Engagement	86.67%	13
Application of content or transfer	66.67%	10
Performance assessment or artifact creation	60.00%	9
Affective outcomes (e.g. attitude, motivation)	60.00%	9
Creativity	6.67%	1
Test grades or course grades	73.33%	11
Other (please specify)	33.33%	5
Total Respondents:		15

Interviews: Outcomes

When asked during interviews about the outcomes they desire for users of their products, interviewees gave a range of responses, and these did vary predictably with the types of products they develop.

Most respondents talked about improved student learning as a main desired outcome, but there are variations in what they meant by learning. A few talked about improved tests scores on state or yearly assessments, others mentioned performance at the course level, such as pass rates, while others referred to conceptual knowledge of specific academic content. The word “engagement” came up very frequently, but respondents’ meaning of engagement varied from engagement with the product to engagement with the content.. Companies referring more to learning of content were generally those creating products that were more content-focused, and also referred to outcomes such as transfer of learning,

the “story behind content learning,” and intrinsic motivation to pursue certain subjects. Some company representatives added they want teachers and students to have “good experiences” with their products.

There were companies expressing broader outcome goals, such as subsequent course enrollments, college matriculation, and even career advancement.

Role of Research in Marketing

Two questions referred to marketing and selling products.

How do you use research in sales and marketing?

Answer Choices	Responses
To showcase the outcomes of our product	60.00% 9
To compare our product/service to competitors'	0.00% 0
To compare outcomes from using our product/service to a control case or customers' existing outcomes	40.00% 6
Total	15

What type of evidence carries the greatest weight in your company's decision making?

Answer Choices	Responses
Expert Review	0.00% 0
Focus Group	0.00% 0
Pilot Study	6.67% 1
Case Study	40.00% 6
Comparison Study (treatment and control groups)	13.33% 2
Controlled Comparison Group Study (treatment and control groups, controlling for multiple variables)	6.67% 1
Randomized Control Trial	0.00% 0
Other (please specify)	33.33% 5
Total	15

Interviews: Marketing

When referring to research when marketing their products some representatives said that

they sometimes refer to research concerning their product category, rather than research on their product specifically. Others refer to learning science research that supports the benefits of their products' affordances – such as automaticity, data collection, data analysis, and visualization. Most said that many school districts are satisfied with seeing the results of school-based case studies, with some preferring pilot studies with either a pre-post or treatment-control group comparison. However, one representative from a very large successful company stated “some enlightened school districts want to see more sophisticated efficacy research, and even want research reports so that they can look at the actual methodologies and results.”

Interviews: Future or Desired Research

Most company representatives said they were interested in having more formal efficacy research done on their products, using more controls and with more validated instruments. A few said they are gearing up for that now, with one company having a goal of “formal studies by 2018, done by a third party.” Others want longitudinal studies to track performance changes over time, and even larger case studies, with standardized tests. Overall, a main goal for these responding companies is to better understand the factors that lead to learning, with some more specifically concerned with being able to connect overall student or user performance to the features and actual usage of their products. Indeed, during a JEA Symposium breakout session several developers confirmed “context matters;” they want to understand the conditions under which their products can lead to learning or positive outcomes. As one developer stated “it’s not just the tool.”

Summary, Limitations, and Implications

Overall, all responding companies stated that they are engaged in some types of research or evidence gathering. More of the research currently being done is connected with product design and development, but there is also research being done on the outcomes of product implementation. This research takes multiple forms, but much of it involves pilot, case, and small comparison studies. While some companies are also doing more controlled studies and internal analyses of student data (e.g. growth data), all see potential value in conducting more controlled studies.

Most of our findings can be interpreted through the lens of the *Learning Science*, *User Research*, and *Evaluation Research* categories described by Digital Promise. We also have findings regarding: (1) reasons why large scale research is not done by some companies (e.g., time, expense, fidelity), (2) developer research budgets, and (3) how the research developers do conduct, or access from others, is used in marketing their education technology products.

Clearly this survey has limitations. First, other practitioners and researchers may have different definitions and approaches to determining the meaning of popular educational technology products, and thus may have ended up with a different list of companies to

survey. Second, we had a low full-response rate. Those companies not responding may use or rely on research in alternative ways, and to varying extents. Some committee members have speculated that some of those companies may do little or no research. Third, responses were from one company representative, who may not have been aware of all of the research endeavors of the company.

Regardless of these limitations, the fact that the product developers surveyed and interviewed are making use of research in the different phase of product development and that they are interested in being involved in more rigorous research endeavors in the future, focusing on the conditions and outcomes from implementation of their products, is promising.