EdTech Decision-making in Higher Education

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This report and a summary are available at www.edtechdecisionmakinginhighered.org. In addition, the website hosts an Online Repository of links and documents that may be useful to EdTech decision-makers, many of which were collected from our interviewees and are referred to in this report.

List of Boxes

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Working Group B Roles

Working Group B convened by phone once per month between July 2016 and April 2017 to help design and plan the execution of the study *EdTech Decision-making in Higher Education*. Mark Triest proposed the initial sample structure. Group members proposed individuals and institutions to invite to participate in the study and facilitated introductions. Recruitment and interviewing for data collection were conducted by Fiona Hollands, Maya Escueta, Whitney Kilgore, Stephanie Moore, Kristin Palmer, Phil Hill, MJ Bishop, and Jerry Rekart. Transcripts were coded by the first four researchers. Analysis and preparation of reports were executed by Fiona Hollands and Maya Escueta.

Summary

An eight-page bullet point summary of Working Group B's findings and recommendations is available at https://www.edtechdecisionmakinginhighered.org/.

What is EdTech?

According to Audrey Watters (2012), EdTech is a term that encompasses "…research, reading, writing, collaboration, communication, creation, logic, standardization, compliance, hardware, software, money, policy, privacy, accountability, practice, theory."

Goals of *"EdTech Decision-making in Higher Education"*

➢ Understand the various factors and information sources that influence decisions about educational technology (EdTech) acquisition and use in higher education.
➢ Provide transparency regarding the steps and stakeholders involved in the EdTech decision-making process in higher education.
➢ Identify and showcase best practices in EdTech decision-making processes to share with other higher education leaders and EdTech providers.
➢ Identify ways in which education researchers, higher education decision-makers, and EdTech providers can collaborate to serve the best interests of learners.

Intended Audience

➢ Decision-makers in higher education including but not limited to Presidents, Chief Information Officers (CIOs), Chief Academic Officers, Chief Innovation Officers, Directors of Instructional or Academic Technology (IT), Directors of eLearning, Provosts, Deans, Department Chairs, and faculty members.
➢ Vendors of higher education EdTech.
➢ Researchers in EdTech issues related to higher education.
➢ Funders of educational programs and interventions.

Acknowledgements

Introduction

"It's a crazy world out there in EdTech land for higher education decision-makers: every week, there's a new start-up with a new "save the students!" innovation, sure that their gizmo/dashboard/simulation/platform/collaboration software is the critical piece to unlock the passion and performance of their students. And, of course, there are hundreds, thousands, of caring marketing professionals eager to help get the "best" messages out about their products and services, and why they are (always) "just right" for an administrator's or teacher's most challenging problems."

(Saxberg, 2016)

It's true, the EdTech tide is relentless and higher education is being swept along in the current. Chief Information Officers, Chief Academic Officers, and Chief Innovation Officers; Directors of IT, Digital, and eLearning; Deans and other higher education decision-makers are tasked with reconciling the need to promote student learning and support faculty research with pressures to keep up with technological advances. EdTech can promote these goals by facilitating access to content, providing opportunities for collaboration, increasing interactivity in instruction, allowing for individualization of instruction, and producing endless amounts of data to be studied. At the same time, it raises concerns about data security and privacy. Many higher education decision-makers are struggling to constrain free-for-all acquisitions across campuses that lead to EdTech proliferation.

What are the EdTech decisions being made in higher education and how are these decisions being made? What role, if any, does research play in the decision-making process? These are the questions that Working Group B was tasked with addressing over the past year and this report shares what we found. Mark Triest, an experienced EdTech executive who was formerly President of Intellus Learning, set the scene for us last June by providing an overview of the types of software acquired and the types of decision-makers involved in these EdTech acquisitions in higher education:

> *"There are two major categories of software used in higher education: administrative and academic. Each tends to be selected through different processes and by different decision-makers (e.g., a Provost for academic software and an SVP for admin software). The role of research is likely to be different in each case. Procurement of administrative software tends to follow a systematic process with committees searching for vendors, participating in demos, ranking options and so on. For academic software, unless a department-level decision is made by a committee, it is often faculty members individually identifying tools useful for their teaching. Faculty members are hard for vendors to reach. Sometimes they ask for pilots which are expensive for the vendor and often lead to nothing.*
>
> *Within each type, there is also a further breakdown between enterprise software (i.e., software that is used at the institutional level such as a learning management system (LMS) or library system software) and departmental software (i.e., software that is used by a specific office or department, e.g., a social media tool for the careers office, fundraising software for the alumni office). Distinctions in the EdTech procurement process are likely to arise between 2-year and 4-year institutions of higher education (IHEs) and between non-profits and for-profits. Community colleges are more like for-profits with a greater degree of centralized decision-making. Public universities are usually required to issue RFPs but others may also."*

Triest described three main types of EdTech decision-makers in higher education:

- ➢ Administrative office decision-makers purchasing EdTech for discrete or finite administrative uses, e.g., in career services, continuing and professional education; directors of instructional design, or teaching and learning centers; directors of digital or online learning; AVPs and SVPs of innovation, and registrar's offices.

- ➢ CIOs who tend to be involved in all EdTech decisions to some extent, even if primarily checking the boxes regarding compatibility with hardware and existing systems, security and accessibility issues etc.

- ➢ Academic department decision-makers who are using EdTech for teaching and learning. Maybe a Provost, departmental committees, and faculty members.

From this starting point, Working Group B set out to design a study involving these kinds of decision-makers from both for-profit and non-profit IHEs, and both 2-year and 4-year IHEs.

Background on Decision-Making Models

Decision-making with respect to EdTech is often a multi-step process. If it were to follow a rational model of decision-making (Edwards, 1954), it would begin with someone - perhaps faculty members, technology personnel, or students - identifying a need. The first decision is whether the need is serious enough to expend time and resources on trying to resolve it. If the answer is 'yes,' the next step would involve identifying possible solution options, researching how well each one meets the needs of the relevant stakeholders, and selecting one that not only solves the problem to be addressed, but is affordable and feasible to implement. Sensible as this might sound, criticisms of the rational model abound:

- ➢ Majone (1989) questions the acceptability and reality of decisions that involve a limited number of actors "engaged in making calculated choices among clearly conceived alternatives" (p. 12).

- ➢ There are doubts over the availability of complete information, our ability to identify all possible solutions, and the existence of optimal solutions (Simon, 1957).

- ➢ It enforces normative values on decision-making and does not conform to the reality that policy is and should be made incrementally (Braybrooke & Lindblom, 1963; Lindblom, 1959).

- ➢ It underemphasizes or ignores the role of value judgments (Brewer and deLeon, 1983).

- ➢ Linear problem-solving is unrealistic because research rarely influences policy decisions directly (Weiss, 1979).

- ➢ Scientific knowledge accumulates through multiple studies, which often yield inconsistent conclusions, and the applicability of a given study to a particular option is in itself a judgment – usually based on whether it justifies an existing position or opinion (Gormley, 2011).

From a decision-making perspective, universities have often been characterized as "organized anarchies" (Cohen, March, & Olsen, 1972, p.1) in which faculty and students operate with a great deal of

autonomy and administrators struggle to manage disparate interests (Birkland, 2011). Rational decision-making at such organizations is hard to orchestrate. Cohen et al. suggest that, more often, decisions at universities are made according to the "garbage can model" in which the actors begin with solutions and then look for problems to solve with them. In the case of EdTech, the solutions are software and hardware tools, or initiatives and strategies that simultaneously integrate multiple tools.

In practice, most real-life decisions are too complex and surrounded by uncertainty to allow for a totally rational process in which a decision-maker can use information to identify a single best solution to optimize achievement of her or his stated goals (Simon, 1976). Furthermore, human capacity to process information is limited (Goldstein & Katz, 2005). When faced with too much information and too many options, decision-makers often revert to instinct, which usually limits the options considered (Bonabeau, 2003). Simon argues that, realistically, the best we can hope for is "good" decisions that are the "outcome of appropriate deliberation" (Simon, p. 67) and that action is taken to reduce uncertainty, for example, through the consideration of research evidence.

Recognizing the limits of rational models in which a single goal is optimized, a variety of "multi-criteria decision making" (MCDM) methods have been developed in fields such as business, management sciences, medicine, and engineering to structure and guide systematic decision-making processes in situations where multiple factors must be considered, an array of data is potentially available, and multiple stakeholders are involved. According to Zopoundis and Doumpos (2017), MCDM is more appropriate than single-objective optimization approaches (e.g., those that focus only on reducing costs or maximizing profit) when the problem to be solved has multiple facets, needs to incorporate the policy judgments and preferences of stakeholders, and is associated with uncertainty and risks in implementation of the solutions. These models may be more applicable in higher education than rational models, and more desirable than the garbage can model. Mustafa and Goh (1996), and Ho, Dey, and Higson (2006) identify numerous applications of MCDM in higher education, mostly to resource allocation decisions. In these models, the stakeholders affected by a decision follow a series of steps that appear similar to a rational model but key differences are that multiple stakeholders are engaged, multiple objectives can be accommodated, both subjective and objective, and judgment is incorporated by allowing stakeholders to assign different importance weights to each of multiple decision criteria.

To assess how well MCDM models apply in current decision-making practice among U.S. IHEs, we designed our interview protocol to investigate whether and how different stakeholder groups are involved in EdTech decision-making, whether goals and criteria for selection are set out in advance, and what procedures are followed to evaluate the EdTech solution options being considered.

Use of Evidence in Decision-making

Policymakers, funders, and taxpayers increasingly expect educators to make evidence-based decisions with respect to the tools and strategies employed to educate students. However, several barriers curtail the use of research-based evidence in education decision-making. One is the tension between research evidence and ideology – values and preferences. A solution option that is incompatible with local values is unlikely to be accepted regardless of its documented effectiveness. Second, research evidence may not be accepted by decision-makers if its conclusions are not supported by what Feuer (2015) calls "*experiential evidence*," which derives from professional practice and experience. Third, as Hanushek (2015) observes, research evidence often does not point to a solution. For example, despite the fact that we know that the instructor is of critical importance to student outcomes, this knowledge does not guide a clear answer as to how to apply it. As a result, solutions must often go beyond the existing

evidence into the realm of opinion. Fourth, it is often difficult to produce high quality research evidence quickly or decisively enough to influence a policy question (Resnick, 2015). To date, this problem remains unsolved and something has to give – either the evidence used by policymakers will not be as rigorous as researchers desire, or the high quality evidence that researchers prefer to produce will rarely influence a current policy decision.

Even when strong research evidence does exist that a strategy or product produces the intended effect s*omewhere*, it is a long and uncertain path to conclude that it will work "*here*" – in your own particular context with your own constituents, prevailing conditions and "support factors" (Cartwright & Hardie, 2012). Similarly, the fact that something works in a pilot does not guarantee success when rolled out at scale.

While there is little consensus among education practitioners, researchers, and policymakers as to what should count as evidence for decision-making (Lai & Schildkamp, 2013; Tseng, 2012), decision-making influences and processes have been widely studied in K-12 education. It is well established that K-12 education decision-makers often consult three main types of information for decision-making: local knowledge, data, and scientifically-based research (see definitions in Box 1). Research findings may be used conceptually to influence decision-makers' understanding of the decision problem, symbolically or politically as a tool of persuasion to justify a decision already made, and instrumentally to directly guide and shape decision-making (Finnigan, Daly, & Che, 2013; Honig & Coburn, 2008; King & Pechman, 1984; Nutley, Walter, & Davies, 2007; Penuel et al., 2016; Tseng, 2012; Weiss, 1977). Little comparable work has been conducted in higher education and specifically in EdTech decision-making. One exception is Acquaro (2017) who surveyed and interviewed administrators of online learning in U.S. IHEs to investigate their decision-making processes and the factors that influence the selection of online learning platforms and tools. When asked to identify and rank the top three factors influencing their choices from a list of 20 factors, these administrators placed recommendations from faculty highest (arguably the equivalent of "local knowledge"), effectiveness based on academic research studies second, and ease of use for faculty third. However, it is not clear exactly how the research studies influenced their decisions, nor whether this factor would have been named in an open-ended question without a list to choose from.

In the context of this project, we define research evidence as information gathered systematically to help assess how well alternative solution options meet decision criteria. Following Honig and Coburn (2008), we use the term broadly to include 1) research on program effectiveness, costs, and efficiency, either conducted at the site facing the decision problem or at other sites, 2) data on program implementation, student engagement, and student achievement, and 3) local knowledge derived from practitioners' experience or feedback from faculty, staff, and students. One of the purposes of this study is to elucidate the patterns of evidence use in higher education decision-making.

Simon (1976) argues that in order to understand complex decision-making, we must assess what information is available to the decision-makers, what forms of representation are preferred, and what algorithms are used in the decision-making process. Accordingly, we set out to understand what are the types and sources of information EdTech decision-makers use and what processes they engage in to select educational technology for the purposes of facilitating and supporting teaching and learning.

Box 1. *Information Used in Education Decision-making*

Scientifically-based research is defined by the No Child Left Behind Act as "research that involves the application of rigorous, systematic, and objective procedures to obtain reliable and valid knowledge relevant to education activities and programs." It includes both observational and experimental studies that assess the effectiveness, cost, and efficiency of educational activities and interventions.

Data includes information on inputs, processes, outcomes, satisfaction, and context which is systematically collected, analyzed, and organized with the purpose of helping educators, administrators, and educational policymakers make decisions that lead to better school and student performance (Ikemoto & Marsh, 2007; Lai & Schildkamp, 2013; Marsh, Pane, & Hamilton, 2006). There is a growing literature on how to use school data, such as test scores, grades, discipline reports and attendance, to inform decision-making (Bowers, Shoho, & Barnett, 2014). Recent developments in data-mining and the creation of automated data dashboards to summarize critical metrics are helping decision-makers make sense of often excessive amounts of data in education.

Local knowledge, also called practitioner knowledge, refers to information derived from practitioners' experience, the feedback from teachers, parents, and students (Honig & Coburn, 2008), and examples that illustrate typical or exceptional characteristics of an issue (Asen, Gurke, Conners, Solomon, & Gumm, 2013). Although not acknowledged by federal policies, local knowledge seems to be an important source of information that guides decision-making in education (Honig & Coburn, 2008).

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Methods

Research Questions

- What sources of information are higher education leaders and faculty currently using to make education technology acquisition decisions?
- How is research used in their decision-making processes?
- Do institutions of higher education (IHEs) conduct their own investigations or research into how well EdTech products currently being used work?

Sample and Interview Content

We interviewed 52 EdTech decision-makers from 43 IHEs between September 2016 and April 2017. While in most cases only one person was interviewed at each IHE, in a few situations two or three people participated in the study. We aimed to include 2-year and 4-year IHEs, public and private IHEs, and for-profits and non-profits (see Table 1 below which shows the distribution of the 51 U.S.-based interviewees across the institutional types). Interviewees, their professional roles, and their institutions are listed in Appendix 2. The interviews elicited information on who participates in decision-making about EdTech to facilitate and support teaching and learning; where these decision-makers obtain information on EdTech products and trends; and what individuals or organizations they perceive to be opinion leaders, change makers, or innovation leaders in EdTech. Interviewees were asked to identify an EdTech decision in which they had recently participated, and to answer a series of questions about the goals of the decision, the stakeholders affected, and the decision-making process itself. Questions also addressed the role of research in EdTech decision-making and whether the IHEs conduct any of their own investigations into how well EdTech products work.

Quantified findings in our report use the number of interviews as the unit of analysis. Forty-five interviews followed the regular protocol shown in Appendix 3 and these form our main study sample. One additional interview focused specifically on the use of Net Promoter Score in higher education for gathering student and faculty feedback. This is reported in Box 13. The 47th interview (and 52nd interviewee) was with an interviewee from a university outside the U.S. and is therefore not included in the main sample of 45 interviews. The purpose of the non-U.S. interview was to provide a counterpoint to the U.S. perspective. Lessons from this interview are reported separately in Box 15. Full details of our sampling strategy, recruitment procedures, and interview process are in Appendix 1.

Table 1. *U.S. Based Interviewees by Type of Institution*

Type of institution	Number of interviewees	% of interviewees
2-year private non-profit	2	4
2-year private for-profit	6	12
2-year public	8	16
4-year private non-profit	13	26
4-year private for-profit	10	20
4-year public	12	24
Total	**51**	**100**

Of the 45 interviews in the main sample:

- 58% involved decision-makers at private IHEs and 42% involved decision-makers at public IHEs
- 69% were from non-profits and 31% from for-profits
- 31% were from 2-year institutions and 69% from 4-year institutions.

Findings

Part I. Higher Education Goals Being Addressed with EdTech

How are the needs for EdTech adoptions, acquisitions, or use identified?

Even without referring to formal decision-making theories, many interviewees referred to the tension between starting with a need vs. starting with a technology solution, and several settled on a middle ground of cycling back and forth between needs and solutions. At one extreme, interviewees like Karen VenDouern-Srba, Vice President of Academic and Instructional Technology at American Public University System, insisted in always putting pedagogy first: "*I have a policy where I will not put a product or a technology into the classroom that's not going to serve a pedagogical purpose. Like I'm not going to just put videos and animations in courses for the sake of it. They really need to be connected to some type of pedagogy and some type of student outcome that will help that student be more successful and pass that class. The big thing for me is how can we use technology to scaffold student learning when it's two in the morning and there is no instructor at hand?*"

Ron Hutchins, VP – IT at University of Virginia, represented the pragmatic middle ground, initially stressing the need to start with the issue that needs to be solved, rather than simply try to find uses for available tools: "*Technology in and of itself is useless unless it's in support of the business of the university. To me this is one of the things that we miss on a continual basis: we don't start with the business of education, we start with, 'Here's a tool.' It's kind of like the old adage, 'Bring me a rock.' 'No. This isn't the rock I want.' 'Well, what's wrong with it?' 'I don't know. Bring me another rock.' We keep looking for new rocks until we find something and somebody says, 'Oh yeah. That's the rock I want.' Here, it's all about the need to keep up with the technology as a point of pride rather than as a point of successful integration.*" At the same time, Hutchins acknowledges the importance of cycling between educational needs and what technologies are available: "*If I'm trying to identify the need and then I have to select technologies based on the need, I have to know what the technologies are so there's an iterative process that happens.*"

A few IHEs operate their own Research and Development (R&D) centers that focus on EdTech solutions to institutional challenges. As one President described: "*… if one of our institutions was concerned about persistence at the undergrad level and they were looking for solutions that would help with their unique set of needs, then our R&D group would go look for them. Whereas another school may believe their next strategic thing is to provide more individualized learning - maybe they are looking for adaptive learning components.*" Jennifer Sparrow, Senior Director for Teaching and Learning with Technology at Penn State, identified a similar role for her own group: "*Our role is to balance the available technologies and trends with the questions and concerns that we know we face as a campus: affordability, accessibility, and student success, ensuring that all students have a successful experience curricularly.*" However, identifying surmountable pedagogical needs is not always so easy. In Box 2, Kyle Bowen, Director ETS at Penn State, and Sparrow described the concerted efforts needed to draw these needs out of faculty in a way that permits solutions to be found.

Some interviewees pointed to a more experimental or investigative approach to EdTech. Indeed, at some IHEs, an entire unit is tasked with staying ahead of the curve with respect to educational innovations and how they can apply to instruction. Kyle Bowen described the role of the emerging technologies group at Penn State: "*The only way to truly understand the implication of a technology is to invest in it in some way… We have an emerging technologies group inside our organization, and their whole focus is on early evaluation. As tools are being launched and just coming onto the market, at that*

Box 2. *Engaging Faculty around Technology Needs for Teaching and Learning*

Kyle Bowen, Director ETS, Penn State: "*I've tried a lot of different ways to talk to faculty about what their challenges are. They're usually things like, 'My students won't read,' 'They won't come to class,' that kind of stuff. It's a little harder to solve. There's one engagement mechanism that helps us with faculty which is using storytelling to draw responses. As you talk with faculty, you can paint a picture of the future: 'What if the world worked a certain way? What do you think about that?' Some faculty say, 'That's a horrible idea,' and others will say, 'That's a great idea. Here are ten ways I would implement that in my course.' It's through those kinds of more organic interactions that we get feedback.*

We've designed events and programs that create excuses to have those conversations. Our biggest one is an annual symposium on teaching and learning. It draws between 500 and 600 people from across the university on a Saturday to talk about teaching and learning with technology. This is one forum where we can engage faculty and begin to tell those stories and listen to their stories. So much comes out of that that drives exploration for the next year. We also have our fellowship programs where we engage faculty in year-long research projects. I really wish there were a more structured, predictable way to get at it, but the only thing I've learned is that asking faculty what their challenges are doesn't work."

Jennifer Sparrow, Senior Director for Teaching and Learning with Technology, Penn State: "*Yes, it shuts them down. One thing that we just had a recent success with, is we started a Teaching and Learning with Technology university award. This allows faculty to share their successes with learning technologies. Faculty have an opportunity to say 'This is what I'm doing, and this is how it changed my teaching.' It really expanded the pool of people with whom we had contact.*

In the faculty fellows program, we identify five or six themes that we see on the horizon, or emerging tools, and we put out a call for proposals. One of them was wearables, one is learning spaces. By just saying, 'If you want to work with us around this topic we can provide you with a yearlong set of resources,' we're able to drive the conversation at Penn State in ways that are pushing the envelope. Some of them are winners, and some of them, they're winner projects, but they don't roll out into anything larger. MOOCs are no longer a big thing, for example."

Kyle: "*When you're awarded a fellowship, essentially you're surrounded by a team to pursue your project with you. If you imagine the faculty member as kind of quarterback of that team, you're surrounded by all the positional players you would need to accomplish your project. It may be instructional designers, technologists, programmers, research scientists, data scientists, media developers, video developers. It could be anything. It's based on what you need to accomplish your project. A faculty innovator in residence is another new thing we're experimenting with. We've bought a faculty member out of her courses for two semesters to work with us on a number of initiatives.*

If we're looking at engaging in something new, like 3D printing, we look for faculty in different disciplines that have similar instructional challenges. Once we begin to identify those, that indicates a spectrum of need that exists across them. Then we begin to put together what would essentially be a coalition of faculty around an idea, around a service or around a technology. In some cases, we create fellowships and sponsor faculty to explore what that technology looks like, and how we might bring something like that to scale. Then from there, we engage in a much larger project to design what that looks like implemented as part of the coursework, or what it looks like implemented as part of research."

point there is no research that exists in these spaces. In many cases, we may be the first people to have hands on with some of these things. That's where we've developed our own ways of doing early evaluations on technologies to understand is it even viable as a technology? Does it connect to the wireless the way we need it to? Does it have the accessibility features that are required to make this successful? That early evaluation role is really important to understand the ways emerging technologies can be used. We loan them out to our faculty or bring the faculty in to have conversations about them and ask them, 'Hey, what do you think about this thing? How would you use it inside of your class?'"

Others acknowledged that while they generally start with an identified need, there are times technology is used to enhance the status quo even if there is no real problem to be solved. Greg Karzhevsky, Chancellor of Jersey College, provided an example: "*Let me start off by saying when we look for technology, there's a reason for it. It's not just to have technology for the sake of having technology. There needs to be a purpose for it. And that purpose generally comes from identifying a concern or issue. Sometimes, not always, sometimes it's, 'If we have this, it would be great for our students. It would be great for our faculty.' It's not even that we necessarily identify a problem, but we know that if we create a simulation lab with high fidelity and very sensitive information equipment, it's something that would really benefit our students in making them ultimately better nurses. It's not necessarily a problem we're having because it's not that we've identified that they're not coming out as good nurses, but they would be even better. So yes, sometimes those decisions are made.*"

A disciplined approach to matching EdTech to pedagogical needs is not always followed. One interviewee remarked that while the IHE's Director of Academic Technology conducts research on the pedagogical value of EdTech tools being considered for the classroom, *"… there is probably another 50% to 75% that's just the CIO wanting to have some cool technology in the classroom. Which is only saying that how he thinks is, 'Let's just get this going and see what happens.'"*

Prof. Phillip Long, Associate Vice Provost & Chief Innovation Officer at the University of Texas at Austin, expressed concern about the influence of funders on the needs vs. solutions dichotomy in EdTech: "*One of the concerns I have is that some initiatives that the Gates Foundation funds appear to be based on the presumption that the solutions to pedagogical problems can be found with the right selection of educational tools. I don't buy that. Fundamentally, I don't think that's true. I think there are places where educational tools can make a positive contribution, but they're not always the solution. To think about it through the lens of 'We can solve these problems by coming up with a mechanism to make the right tool selection and give you the right checklist,' I think is not only fallacious but dangerous because you are missing out on the things that actually matter pedagogically.*"

At some IHEs, there is a deliberate effort to move away from starting with the tools. Dennis Bonilla, Executive Dean at the University of Phoenix, pointed to the benefits of de-emphasizing the technology per se in favor of student outcomes: "*We've seen our retention and progression increasing quite dramatically over the last year as we have focused more on those issues than we do on slick technology.*" Michelle R. Weise, Chief Innovation Officer of the Sandbox ColLABorative at Southern New Hampshire University (SNHU), described SNHU's revamped approach to EdTech: "*What we've now done is, instead of being in a reactive mode to every vendor and saying, 'Oh, that's a pretty cool recruiting tool. I wonder if we could use it somehow in the university,' is we have now collected strategic priorities from each unit and how they think technology plays a role. These are basically their thesis statements about education technology. Now that we have those, when a vendor comes to us and says, 'Hey, we have this shiny new product,' we can say, 'That's wonderful, but it really doesn't relate to our priorities at this moment.' So it's a lot easier to weed them out on the front end, and it's also easier for us to figure out, 'Okay, this*

seems interesting. Who else would we want to bring in to get a broader perspective of what's going on here?'

Sometimes, the need for a technological solution exists but the solutions are unaffordable. Occasionally, the "solutions" are not developed enough to meet the need adequately, and the IHE defers a decision for a year or two while the vendor or developer catches up. Other times, as Lee Wetherington, Dean of Administrative Services at Lenoir Community College remarks, the original goal gets lost in the process: "*Sometimes it's easy when you start thinking through all the different things you want in the technology to lose sight of what were we trying to solve in the first place.*"

Many IHEs establish communication lines to allow faculty, students, and staff to provide input as to their EdTech needs, for example, by administering regular surveys to solicit feedback. These often surface frustrations with the existing technology as well as demands for new technologies. As Joseph A. Moreau, Vice Chancellor of Technology, Foothill-De Anza Community College District observed *"…sometimes that need is, 'We've been doing it this way for a long time and it sucks, and we got to do better,' or, 'We have not been able to do this at all and boy we'd really like to find something that could help us do that*.'" In one instance at Siena College, user feedback identified limitations of the college's existing room scheduling software and spurred the college to consider alternatives. At another IHE, survey feedback propelled full-scale consideration of whether to replace the current LMS: "*Our EdTech user support group has conducted surveys every few years. Some of the faculty interested in active learning or novel educational technology have been unhappy with the tools that are available, so they've been more and more vocal about the need for a better LMS system and more tools. The user support group is the first point of contact for EdTech issues and knows what the needs and technical problems are.*" (Anonymous).

What needs and goals are being addressed with EdTech in higher education?

Interviewees were each asked to describe in detail one particular decision about EdTech to facilitate or support teaching and learning in which they had participated recently enough to remember the details of stakeholders, participants in the process, and the process itself. Most interviewees chose to focus on decisions that either led to or could potentially lead to an institution-wide EdTech implementation, while the remainder described decisions that affected a specific program, course, or instructional space. We asked what the goals were for this EdTech-related decision. Table 2 lists goals that were identified in four or more of the 44 interviews in which this question was asked, and the frequency with which each was raised. In some cases, more than one goal was identified for the decision discussed.

Table 2. *Goals for EdTech Decisions*

Goal for EdTech decisions	% of interviews in which this goal was mentioned
Support a variety of pedagogical and assessment models/strategies	41%
Operational efficiencies/cost reductions	36%
Increase capacity to serve students online/facilitate interaction at a distance/increase mobile accessibility	30%
Improve user experience/modernize or upgrade functionality of existing system	27%
Standardize curriculum across campus/ create consistent student experience	14%
Improve outcomes for students	11%
Meet regulatory and reporting requirements	9%

Supporting a variety of pedagogical and assessment strategies

The most common goal identified for EdTech decisions was to support a particular pedagogical or assessment model or strategy. Specifically, these included:

- ➢ Increasing opportunities for collaboration among students, faculty, and alumni
- ➢ Increasing interactivity of content
- ➢ Individualizing instruction, e.g., by establishing data analytics capacity to adjust curriculum, instruction, and support based on student performance, or allowing students to accelerate at their own pace
- ➢ Promoting active learning
- ➢ Experimenting with virtual reality
- ➢ Increasing student agency
- ➢ Providing authentic assessments
- ➢ Implementing competency-based education
- ➢ Facilitating flipped classrooms and blended learning options
- ➢ Increasing the amount of academic feedback provided to students.

While in the majority of cases, the goal was assumed attainable at least to some extent with currently available technology, one interviewee described a still-aspirational goal which we offer as a challenge for EdTech developers:

"One thing I'll say that I'm interested in, and we're trying to figure out, is how to allow our technology to facilitate the interaction between the student, the faculty, and the academic advisor. Our students have a strong relationship with both and each relationship is different. Students often won't call a faculty member because they're a little intimidated or they don't think it's the right thing, but they will call an academic advisor. But the relationship between faculty and advisors is tricky. Sometimes faculty don't want advisors in their business. The other side is academic counselors are desperate to help students because they want them to succeed. Having an open line and stronger relationship between the faculty and advisors to share more information is really important and valuable. We know it from the small interventions that we've done with predictive analytics and alerts, but we can do much, much more. We tried one tool, and it failed miserably although they said, 'This is going to be the sliced bread, and the single thing that's going to solve all your problems.' It purported to do just what I'm saying. It did not. I use that as an example of something that we really want to do. Of course, a lot of it is policy and process. The technology is the third leg of the stool, and it's not easy." (Anonymous)

Improving operational efficiency and reducing costs

In over a third of the interviews, a goal of the EdTech decision discussed was to improve efficiency of the IHE's processes and/or to reduce costs to the IHE and/or students. Specific goals within this category included:

- ➢ Facilitating faculty modifications of standardized curriculum
- ➢ Updating curriculum more easily
- ➢ Aligning timing of content delivery across courses
- ➢ Improving faculty ability to advise students and help them plan degree programs
- ➢ Improving access to software and instructional content needed by students
- ➢ Providing an enterprise-wide solution for collaborative storage among faculty and students
- ➢ Reducing costs of shipping books
- ➢ Avoiding delays in access to books at the beginning of each semester
- ➢ Providing better self-service for student transactions with the institution
- ➢ Integrating room scheduling, audio-visual (AV) resources, room setup, and dining, and connecting to the IHE's website for advertising events
- ➢ Facilitating and accelerating discovery and procurement of EdTech tools by faculty
- ➢ Standardizing the EdTech procurement process, especially around terms and conditions of licensing agreements
- ➢ Finding a customizable, flexible course management system for use across an entire college system
- ➢ Reducing instructional costs by offering online courses instead of having multiple instructors at each on-ground campus
- ➢ Increasing convenience and flexibility for students
- ➢ Improving the quality of admissions.

Improving efficiency of EdTech procurement

At some IHEs, faculty members each find and acquire EdTech tools independently, while at others, EdTech decisions are made by a central unit and then rolled out to willing or unwilling users. Each approach has its pros and cons. One interviewee expressed frustration with the current system of EdTech acquisition: "*The question you're asking is one I've asked Technology Services over and over again the last few years, which is how do we make a decision in what we invest in? The answer is it's basically ad hoc. That causes all kinds of inefficiencies. At this institution, anything over $10,000 has to go through procurement, but anything under $10,000 anybody can buy if they have the money basically. The $10,000 rule is really kind of problematic. Because it's that high, we have hundreds, if not thousands, of software licenses and applications. Someone said there's a spreadsheet that has been put together with a thousand lines of different services, products, and technologies that are used around the university. It's really, really inefficient. So, for example, you'll find the school of nursing has a license for Adobe Captivate, and it's limited just to the school of nursing when others could probably benefit from it. Maybe they have 50 or so licenses, but I'm guessing that the marginal costs if you were to scale it to some larger level wouldn't be that much.*" (Anonymous).

Decentralized EdTech procurement can lead to technology proliferation problems, requiring that unlimited products are supported by IT, integrated into existing systems, and, in some cases, paid for by students - as noted by Prof. Phillip Long, Associate Vice Provost & Chief Innovation Officer at the University of Texas at Austin (UT Austin): "*Independence of the faculty to make their own decisions about technology without a consultation or discussion has in some instances led to the circumstance where a student can, for example, be taking four courses, all of which require a different brand of clicker, because the independent choice of the faculty was to choose one that they liked. Now, the student is spending an extra $200 for that term and juggling carrying around four different clicker brands. We are now addressing that, and one possible scenario is we will sanction two or three brands and integrate those into the campus enterprise environment. You'll have to choose from this list of two or three, or go through some sort of vetting process to justify why another one does something that these cannot address in terms of their value proposition. This issue has being brought up by the students in their student government. They're complaining about costs, and they're right.*"

Long further observed that, as individual tools become more sophisticated in their functionality, the amount of redundancy also grows: "*What's happened with a lot of these [clicker] products is that they have expanded in scope. They're no longer just response tools. They are methods of doing a wide range of assessments. Learning Catalytics is a classic example. Piazza is a classic example. You can run a class with Piazza and not use an LMS at all, and some people do. You can use Learning Catalytics as your primary means for doing assessments, because they have a variety of different assessment types beyond just voting on a list of questions. A concern arises when add-on tools offer 60% or more of the functionality of the LMS for yet another added cost. Where does one make the trade-off in personal preference vs. redundancy in the face of rising annual expenses?*" James A. Bologa, President and CEO of Porter and Chester Institute/ YTI Career Institute also pointed to inefficient use of tools, but less because of overlap in tool functionalities and more because users simply fail to exploit the functionalities of the tools they have: "*I think that higher ed in general gets consumed with tech, spends a lot of money and time sourcing and coming up with EdTech solutions, but then fails to fully utilize the technology to its fullest extent or to stay with it as it grows.*"

Several interviewees expressed the need for centralizing and standardizing EdTech procurement processes across a campus or system, and some described nascent efforts to do so. For example, Judith

Giering, Director of Learning Design and Technology at University of Virginia (UVA): "*We are now in the process of developing a rubric for everyday tools and technologies. Faculty will come and say, 'I'm using this and I love it,' and we need to figure out, 'Does this have life beyond Professor Jones and is it one that we really want to bring into the UVA digital ecology?' We are actually just now in the process of creating a rubric for that, everything from LTI-integration in [our LMS] to procurement issues like student privacy and things like that, to ADA accessibility issues. Things that in the past we've done very much like in conversation, we're just trying to codify now.*"

Jonathan Becker, Director of Learning Innovation and Online Academic Programs at Virginia Commonwealth University, stressed the need for a way to facilitate better communication and greater efficiency across campus for EdTech acquisition. He suggested a system that allows the user to inquire "*Is anybody else using this? Is there a way we can tack onto your license instead of buying a whole new license?*" Becker commended University of North Carolina (UNC)'s Learning Technology Commons (see Box 3) as an interesting model for EdTech acquisition: "*It's like the App Store meets Amazon where faculty can request certain applications, and then they can give it ratings and reviews.*" He suggested that this App Store/Amazon model combined with a more research-based, systematic approach to evaluating EdTech, similar to the What Works Clearinghouse, would be optimal.

The emphasis for such standardization of EdTech acquisition was on a more coordinated approach facilitated by a centralized unit rather than explicitly mandated choices imposed on faculty. Michelle R. Weise, Chief Innovation Officer of the Sandbox ColLABorative at SNHU, exemplified this approach: "*We've tried to now funnel all of the first looks at EdTech products through the Sandbox - not that we dictate who gets to buy what, but it's more of a centralization of channels, so that we're not duplicating each other's efforts and we're not having three different license agreements with the same vendor.*"

Increase capacity to serve students online, facilitate interaction at a distance, or increase mobile accessibility

Just under a third of the EdTech decisions discussed aimed to increase the IHE's capacity to serve students online, to facilitate interaction at a distance, or to increase mobile accessibility. Particular issues addressed included:
  ➢ Allowing greater flexibility in online course design and participation
  ➢ Providing digital access to content on multiple platforms
  ➢ Providing high quality digital video-conferencing to facilitate participation in events regardless of location, allowing for both town-hall-style and classroom lecture sessions
  ➢ Facilitating instruction for classes normally held on-campus despite disruptions such as student or faculty absence, earthquake damage etc.
  ➢ Increasing online programming offered
  ➢ Creating a separately-accredited virtual campus
  ➢ Facilitating student interactions with alumni
  ➢ Experimenting with online education

Several interviewees alluded to the need for the means of education delivery to keep up with the pace of technology adoption in students' daily lives and workplaces. For example, Donny Gruendler, President of Musicians Institute, noted the anachronism of having the Institute's technologically-advanced students work on paper: "*Moving to e-books was probably easier for us than for other schools because all of our learners are non-traditional. They're already somewhat tech-savvy so it was almost too obvious for us here that we should have students working on a computer. Like they're working on Avid ProTools,*

Box 3. *Coordinating EdTech Procurement across Campuses: UNC's Learning Technology Commons*

The University of North Carolina (UNC) system meets the extremes of centralized and decentralized EdTech acquisition in the middle with a standardized EdTech acquisition platform through which faculty members can pick and choose the tools they want to use. This solution, developed in conjunction with LearnPlatform may be worth emulating. According to Matthew Rascoff, Vice President of Technology-based Learning and Innovation at UNC (now at Duke): "The UNC Learning Technology Commons is a system-wide effort to curate an annotated catalogue of digital learning products available for accelerated purchase by the 20,000 faculty members of the UNC system, and to build a community of educators who share (anonymized, aggregated) learning outcomes and user experiences with those products." (Rascoff, 2016). The Learning Technology Commons has four clear goals as outlined in a memo [available in Online Repository] to the UNC community from Rascoff:

"*We believe the Commons will yield four distinct benefits to constituent institutions:*

Eliminating the need to review and negotiate T&Cs [Terms & Conditions] with the vendors in the Commons;

Lowering costs through vendor price transparency;

Offering a knowledge-sharing community of buyers and users across the system;

Enabling more evidence-based decisions about education technology purchases on the basis of outcomes data shared in the Commons."

When interviewed for this study, Rascoff was explicit about the potential pitfalls of a laissez-faire procurement environment and how the new system helps the EdTech ecosystem: "*We wanted to legitimize the innovative but sometimes marginal behavior among early adopters who may be using EdTech tools without the necessary protections or controls. Just clicking through a vendor license agreement that may not comply with North Carolina law or federal law. We developed a standard set of terms and conditions [available in Online Repository] that we asked EdTech vendors to accept in order to become part of the Learning Technology Commons app store. We then have a system-wide agreement under which all of their work in the public universities in North Carolina falls. That gives us some protection from a regulatory perspective.*

Standard vendor agreements reduce the transaction costs and the lead time associated with implementing what are often low-cost or even free tools. We spend too much time red-lining vendor license agreements. I knew from my own experience working at a K-12 vendor that the lead time is typically 18 months from a first conversation to district-wide implementation. In that time, many good startups go bankrupt. An entrepreneur might build a wonderful product but have no chance of succeeding against the oligopoly publishers because you need 18 months of runway in order to close that first deal. This starves the sector of innovation because it just runs the clock out on startups that may raise two years' of capital. I saw the opportunity to shorten the lead time, make it easier to procure, and give educators and schools better EdTech partners. My perspective comes from having been a 'builder' and a 'buyer,' understanding how hard it is to work together, and trying to reduce the friction."

and they're opening up a three ring binder to work on their homework - going from the computer to the paper. That just doesn't seem to make sense anymore." Matthew Gardenghi, Senior Manager of IT Academic Technologies at Bob Jones University, pointed to the relative suddenness with which mobile capabilities have become indispensable: "*We wouldn't have asked something five years ago on how global-friendly is your platform? Can they take quizzes on their phone? Of course, now we would be asking that question. If they say, 'Well we're kind of not there yet,' okay, next vendor.*"

Improve user experience, modernize or upgrade functionality of existing system

Over a quarter of the EdTech decisions discussed aimed to improve the user experience for students and teachers and improve functionality by modernizing or upgrading the technology. Specific goals included:
  ➢ Increasing intuitiveness and ease of use of the system or product
  ➢ Increasing up-time
  ➢ Moving to an enterprise-level solution
  ➢ Increasing security
  ➢ Increasing flexibility and customizability of the product or system
  ➢ Supporting modern cloud architecture and industry integration standards.

Standardization of educational experience

At for-profit IHEs, a particular concern is to ensure consistent teaching standards across faculty members who are usually "*practitioners first, educators second.*" (Scott Shaw, CEO and President, Lincoln Educational Services). As a result, they may not share common pedagogical practices and expectations for students. Steve Rossiter, Director - IT Support at Delta Career Education, emphasized the importance of standardization in relation to EdTech: "*By and large, what we aim for is consistency in the educational product, particularly in the realm of technology. If we have a school or brand that's authorized to teach something, we try not to have that many variances in the way that it's being taught or the systems that it's utilizing. We preach consistency.*" Consistency of student and faculty experience was also a priority for Rusty Hunt, President of Lenoir Community College: "*If you're teaching in Room 110 and you walk down to Room 220, then you should have the same experience at both places.*"

Improving student outcomes

Relatively few interviewees identified improving student outcomes as an explicit goal for EdTech. In these cases, outcomes targeted for improvement were persistence, retention, passing rates on courses and exams, student retention of theory and knowledge, and a reduction of the skills gap between college graduates and employer needs. Some interviewees went as far as to question the potential for EdTech to substantively improve student outcomes. For example, Matthew Gardenghi, Senior Manager of IT Academic Technologies at Bob Jones University, expressed some skepticism about how EdTech is being used to motivate learners towards completing tasks, emphasizing that he prefers to see *"…outcomes that are showing that students have changed the way they think. Education is about changing the mind and the tools that you use in your thinking process. It's not about whether I memorized some facts or I got a grade. I've grown, I've altered, I'm different because I took this class. That's a vast difference from 'I passed the course and I spent some time doing assignments.' I don't have a problem with gamification to a point, but a graduate who needs gamification to succeed is not a person I'd want to hire because I'm not going to sit there and try to keep motivating them all the time.*"

Similarly, Scott Shaw, CEO and President of Lincoln Educational Services, expressed doubts about what EdTech can achieve: "*Maybe I'm being too cynical about this, but the whole thing with EdTech, on paper*

so much of it can look so great. The question is really in operation, both from the standpoint of the students' receptivity to the product and how it works, as well as the faculty's ability to maximize the product. After having the e-books all up and running for a year or two, I don't see anything that tells me that we're better off from where we were before. I don't know that our costs have been lowered or if our retention rates have been improved. Am I just justifying to myself that this is just the way of the world? This is where the world's going? If you're not doing it, you're considered antiquated?

When we analyzed a lot of the technology, the concepts behind it, and some of the initial excitement around it we were led to believe that the students are having a better experience, and faculty members are excited – 'Wow, I can do this now. I can do that.' But when I look at the overall graduation rates, I can't say that we're transformationally anywhere else."

Meeting regulatory and reporting requirements

Interviewees occasionally made reference to the need for judicious use of technology to avoid legal action - for example, one alluded to [George Washington University being sued](#) "*because people were just uploading PowerPoints in their online courses and not giving students any direction.*" When developing online modules, Steven Goss, Vice Provost of Digital Learning at Teachers College, Columbia University, deliberately chose software which allowed for storyboarding, scripting, narration, and interaction that would help guide, direct, and engage students.

Another issue identified by Prof. Phillip Long, Associate Vice Provost & Chief Innovation Officer at the University of Texas at Austin (UT Austin), is that when faculty independently adopt EdTech and require students to purchase items, the institution can run up against state regulations which prohibit public universities from charging students fees above tuition. The issue was raised first by another institution in Texas that was acquiring a site license for a clicker solution and had reviewed UT Austin's procedures on UT Austin's webpages. The inquiry raised the question which UT Austin's lawyers needed to consider: Was UT Austin violating the law by charging students fees for clickers? A campus-wide discussion ensued to answer the question, and a solution found which recognized clickers as an expression of faculty discretion with regard to their own teaching practices and materials.

Goals for EdTech decisions mentioned in only one interview each included: differentiation from other IHEs; ensuring the vendor's product roadmap aligns with the IHE's; and shifting EdTech costs from the student to the institution.

Creating a culture of innovation

While not mentioned explicitly as a goal for any of the decisions discussed, a number of interviewees implied that their institution generally aims to use technology in innovative ways to address educational challenges. One example was Adrian Sannier, Chief Academic Technology Officer at Arizona State University (ASU): "*Our President is very interested in using technologies to improve the student experience. He is an entrepreneurial risk-taker and has created a culture of innovation and risk-taking at the university. But, to be innovative, you really have to believe there is a need for change in the first place. Innovation carries the risk of failure so we always have a Plan B. We are not afraid to innovate because, if something fails, the focus is on fixing the problems, not on hanging people.*" Sannier attributes much of the innovation capacity ASU to the creation of a special entity in 2009, ASU Online—which is now called EdPlus—which operates as an "amplifier" to the institution, working to bring educational innovation to scale.

About what kinds of EdTech products and strategies are decisions being made in higher education?

Interviewees were each asked to focus on one particular EdTech decision for some of the more detailed questions about the decision-making process. The topics they chose are summarized in Table 3 below.

Table 3. *EdTech Products or Strategies About Which Decisions Were Being Made*

Product or strategy about which decision was made	Frequency (n=44)
LMS	12
Switching from textbooks or paper to ebooks and digital content	4
Online or blended course design	3
Assessment tools: direct assessment platform, institutional testing platform, ePortfolios	3
Adaptive learning platform	2
Classroom response system	2
Online delivery platform	2
Laptops for 1-1 initiatives	2
Student retention "nudge" tool or system	2
Physical spaces: immersive experiences lab, classroom of the future	2
Lecture capture/video capture, streaming, captioning, and storage solution	2
Degree audit program	1
Personalized adaptive math program	1
Platform to facilitate discovery and procurement of EdTech tools	1
Digital storage solution	1
Video-conferencing solution	1
Wireless video projection system	1
Scheduling management software	1
LED monitors for Smartboards	1

Based on the types of decisions identified by interviewees, it is clear that the term "EdTech" is used to refer to software, hardware, physical space, course design, and content. One interviewee categorized EdTech investments as: "*Academic and learning systems; back office systems to support the academic mission; and then back office systems to support the other major functions and core business services, such as finance, student information, HR, or procurement.*" (Anonymous). The majority of the decisions interviewees chose to focus on fell into the first of these three categories. Furthermore, most decisions were being made about facilitation mechanisms at an enterprise-wide level with only a handful being about the pedagogical design of specific programs, courses, or spaces. The type of decision has implications for the criteria likely to be applied in selecting from among product options, and particularly the extent to which research about the impact on academic outcomes is relevant.

Thomas Cavanagh, Associate Vice President of Distributed Learning at University of Central Florida, underscored the importance of ensuring that everyone is on the same page about what "it" is when considering a new EdTech strategy or product: "*We had to make sure, when we said 'adaptive learning,' we were all talking about the same thing and that we were evaluating things all the same way. I did a little PowerPoint - it was real short - that defined what adaptive learning is for the purposes of our evaluation, and then further clarified the different flavors of it - content-agnostic versus content*

embedded into the platform. We talked a little bit about the pros and cons of those, but once we did that, we all understood the pieces on the board and could play the game understanding what the rules are."

Cabinet-level decision makers dealt with an extra layer of decision-making to establish priority levels for EdTech needs, as a subset of IT needs, among many other institutional demands: "*When you're investing in IT you're not investing in faculty salaries, or recruiting faculty, or building labs. The trade-offs are intensely difficult for university leadership to make, especially in universities that have meaningful infrastructure. The thing that kept me most awake at night at [a large state university], and for many of my peers, is the deferred maintenance on the capital plant. It's intense, and the pressure is relentless. You're always trading off between IT and labs and core deferred maintenance for buildings. And, of course, that's at the same time you're facing relentless pressure to reduce cost, and increase financial aid, and keep tuition flat. It's been a difficult decade or two.*" (Anonymous).

Several interviewees pointed out that the selection of EdTech products and services is only the first in a series of decisions and processes related to implementation, often culminating in an evaluation to decide whether to continue use or scale up from a pilot. At Duke University, the initial question was whether to experiment with Open edX as an online delivery platform, the second was whether to hire an external vendor to help integrate and support it, and the third step to date was to select a vendor. Ami Bhandari, SVP of Education and Strategy at Lincoln Educational Services asserted that later steps are more challenging: "*After having made many decisions about EdTech acquisition over the last two years, what's interesting is that's really the easiest decision to make. What's much, much harder is making sure that you have the infrastructure so that students can access it, and the training and implementation with the staff who are going to be teaching with that technology. For us we've found there's usually at least four stages of training for something to get sufficiently and appropriately implemented*."

Matthew Gardenghi, Senior Manager, IT Academic Technologies at Bob Jones University, asserted that decisions about products are less important than dedication to implementation: "*Even a product that is not maybe 100% the best pick, not the perfect product, can succeed very well and advance the organization when the team selecting and implementing it have the commitment, the money, and the resources to make it succeed.*"

Donald Spicer, Assoc. Vice Chancellor and CIO, University System of Maryland, noted that there are also some decisions that are needed but avoided: "*There's another dimension here which has to do with the window of usability for educational technologies, and we're not very good at throwing things off the back of the truck. So we end up with this huge inventory of stuff, which makes it hard for us to move the window. Is it still being used? How is it being used? Most IT divisions are very much invested in using what they have and not looking at what's happening. The doing and the meta-question of observing what you're doing don't connect. Ideally, you need an observer or analyst outside of the IT folks and the faculty.*"

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Part II. Sources of EdTech Information and Influence

What are the major sources of information on educational technology products and trends?

Information on EdTech products and trends is certainly not lacking. Melanie Kowalski from Lackawanna College channeled many of our interviewees with her comment, "*I get bombarded with stuff*." Interviewees described both sources of information (people, organizations, associations, etc.) and the media through which they obtained this information (network events and conferences, publications, social media). We report an overview of sources first (See Table 4), followed by an overview of media (See Table 5), and subsequently drill down into the details of several of the categories.

Table 4. *Sources of Information on EdTech Products and Trends*

Sources of information	% of interviews in which one or more sources in this category were mentioned (n=45)
Colleagues	96%
Vendors	80%
Professional associations or consortia	67%
Consultants	53%
Research or technical assistance centers, think tanks, institutes	9%
Foundations	4%

The most commonly mentioned source of EdTech information was colleagues, both internal and external to the interviewee's institution. One or more individuals or types of colleague were identified in 96% of the interviews. Vendors were the second most common source of information, mentioned in 80% of interviews. Research or technical assistance centers, think tanks, and institutes were mentioned as a source in fewer than 10% of interviews.

Table 5. *Media for Gathering Information on EdTech Products and Trends*

Medium for gathering information	% of interviews in which one or more items in this category were mentioned (n=45)
Network events or conferences	93%
Written publications	91%
Social media and online communications	89%
Other*	22%

* interactions with incubators, accreditors, industries, trades or the training industry, the government or students

The most commonly mentioned medium for gathering information was network events or conferences (93% of interviews), followed by written publications (91% of interviews) and social media or other online communications (89% of interviews). There is clearly an overlap between associations and consortia as a *source* of information and network events as a *medium* for gathering information given

that so many of the latter are organized by the former. The numbers we report in each category are based on explicit mentions by interviewees of one, other, or both.

Sources of EdTech information

Colleagues

Table 6 summarizes the types of internal colleagues mentioned by interviewees, i.e., colleagues who work at the same IHE, and Table 7 summarizes the types of external colleagues, i.e., those working at other IHEs or organizations.

Internal colleagues

Internal colleagues were mentioned 86 times as sources of information on EdTech products and trends across 73% of our interviews (some interviewees mentioned multiple internal colleagues). These colleagues fell into several categories: support and services, faculty, leadership, administrative staff, and committees. Support and services personnel were mentioned most often, in 58% of the interviews. These primarily included IT staff, instructional designers, and academic support teams (e.g., library staff or staff at a Center for Teaching and Learning). Faculty were listed in a third of the interviews, while leadership and administrative staff were each identified as sources in 16% of the interviews.

Table 6. *Types of Internal Colleagues Mentioned as Sources of Information on EdTech Products and Trends*

Type of internal colleague	% of interviews in which one or more colleagues in this category were mentioned (n=45)
Support and services	58%
Faculty	33%
Leadership	16%
Administrative staff	16%
Committees	7%
Other/ unspecified internal colleagues*	11%

*generic mentions of "internal colleagues," "peers," or "informal groups" within the interviewee's institution

CIOs, Directors, and other senior administrators who we interviewed often alluded to staff who were responsible for staying abreast of EdTech trends and new products, and keeping the decision-makers well-informed. Donald Spicer, Assoc. Vice Chancellor and CIO at University System of Maryland, referred to them as the "instigators" of EdTech ideas, while he himself served as the "final arbiter" of investments in EdTech. In order to divide and conquer the overload of information and possibilities, individual staff members are often assigned membership in a particular association, or given responsibility for following a certain area. For example, Shawn Miller, Director of the Center for Instructional Technology at Duke University, indicated that an evaluator on his staff belongs to the American Evaluation Association and shares that research and those journals, while another staff

member belongs to a team-based learning technologies group. Miller aims to have each of his 20 staff members attend at least one conference per year in order to cast a wide net for ideas and trends. Andrew Shean, Chief Academic Learning Officer at Bridgepoint Education, reported that the manager of library resources compiles a weekly EdTech information update and distributes the curated resource to the leadership team.

Kyle Bowen, Director ETS at Penn State, described how faculty indirectly serve as a source of EdTech information: *"A source of information for us has been working with our faculty. It's not necessarily in discussions around EdTech but rather discussions around their scholarship. We have faculty whose areas of scholarship are virtual reality, artificial intelligence and machine learning, or digital fabrication. That helps us stay on the forefront of where these things are going and allows us to translate it very quickly into educational practice. We've done that with 3D printing, we've done that with AI technologies."*

External colleagues

External colleagues listed work at other IHEs, business or industry partners, research organizations, think tanks, and consulting firms. External colleagues were mentioned 81 times as sources of information on EdTech products and trends across 73% of our interviews (some interviewees mentioned multiple external colleagues).

Table 7. *External Colleagues Named as Sources of Information on EdTech Products and Trends*

Category of external colleagues	Percentage of interviews in which external colleagues in this category were mentioned (n=45)
Colleagues at other IHEs	56%
Business/industry partners/vendors	11%
Researchers/think tank personnel	9%
Consultants	7%
Other*	11%

*generic reference to "colleagues at other institutions," or to contacts via informal networking

Colleagues at other IHEs

The majority of external colleagues identified were from other IHEs (67 mentions across 56% of interviews). In some cases, colleagues at other IHEs were mentioned generically as "colleagues from X;" in some cases by role; and in other cases by name. For example, CIOs at other institutions were mentioned seven times as a source of information on EdTech products and trends. Adrian Sannier, Chief Academic Technology Officer at Arizona State University, explained why: "*I talk to CIOs at other universities, especially if they have tried some EdTech that we are considering ourselves. Higher ed is a 'near follower industry.' People like to see whether things have worked for someone else first before they jump in.*" Several other interviewees illustrated the tendency Sannier describes. For example, Joseph A. Moreau, Vice Chancellor of Technology at Foothill-De Anza Community College District, asserted his preference to listen to colleagues from other IHEs over vendors: *"What I tell vendors is, as awesome as your sales team might be, we don't buy products from your sales team, we buy your products from our colleagues. So when you come out and tell us about some really cool thing, then our last question to you*

is: who's already using this or who are you already working with? And especially if there's someone on your reference list that we know, then after you leave, we call them and say, 'Hey, we're thinking about doing this. We understand you guys are doing it. Are you really doing it? Are you really doing it to the extent that the vendor led us to believe? And how's that working out for you?'"

At IHEs that are part of a system such as community colleges, the decision-makers often referred to interactions with peers at sister institutions. For example, Lee Wetherington, Dean of Administrative Services at Lenoir Community College, noted that as part of a system of 58 community colleges he has access to a variety of distribution lists on his email system, e.g., a CIO list, and a PC tech list. He can email the distribution list to find out which college has used a particular technology or vendor in which Lenoir is interested and ask what their experience has been.

Several interviewees referred to listservs that they used for gathering information by sending short surveys out to their peers. For example, one CIO sends an occasional survey question to the Consortium of Liberal Arts Colleges email list asking about specific technology solutions being used at similar colleges. The results of the survey are then available to all members of the listserv. When Mark Berman, Associate VP and Chief Information Officer at Siena College, needs an EdTech solution, he also creates a short survey to collect information about the options used by his peers on the EDUCAUSE CIO list and asks about their satisfaction with them. "*I reach out to the EDUCAUSE CIO list and ask, 'What vendors serve this area or serve this need?' You get two kinds of responses: 'I use these people and they're great,' or 'I use these people and talk to me offline.'*" In one Google Form survey about co-curricular software, Berman asked four questions:

➢ What software system do you use to track student participation in co- curricular activities?
➢ Are you happy with it?
➢ What do you like most, or hate most, about the system you use?
➢ What ERP System do you use?

Vendors

The value placed on vendors as a source of information on EdTech trends and products ranged from positive to negative and everything in between. To some extent, this depended on whether the IHE was teaching about the technology or simply using the technology as a tool to facilitate teaching and learning. Clearly for those teaching about the technology, vendors played a much more critical role. For example, Donny Gruendler, President of Musicians Institute explained why staying connected to vendors is critical for his IHE:

"*We probably have a couple of hundred industry partners that constantly let us know about new technology trends so we can create programs based around that to educate our students. If someone is getting an audio engineering minor and bachelor's degree here, they're going to want to learn about the exact mixing console that came out last week. That's our goal. We're a school of 1,100 students. We're very much like a startup. We're very lean and we don't have a lot of committees and formal processes. We're like, 'Okay listen up, we identified this trend, here we go!' We're always looking for what's next. We're not interested in just teaching what's now. We have to prepare for what's happening next year or two years from now. A lot of times, we're reaching out to industry partners and working with partners that will sign with us so we know what products are coming out three years from now, and we're preparing actors for that. One of the reasons Ableton Live is such a great partner is they'll tell us a year before something comes out and show it to us, and let us kick the tires. Not only so we can give feedback or our students can give feedback, but so that we can create our programs around it. When that piece of*

software is released, we're teaching it. That's one thing where we're constantly reaching out, and I'm constantly asking, "Hey, what's on the horizon, what's on the horizon?"""

A few IHEs we interviewed, such as MIT, ASU, Porter & Chester Institute, and Musicians Institute, acquire a reputation for being willing to experiment with new technology and are often invited by EdTech vendors to participate in beta testing for a product. James A. Bologa, President and CEO of Porter and Chester Institute/ YTI Career Institute, explained this tendency: *"I've been accused by my direct reports as being the shiny penny guy, by constantly changing, chasing innovation. We're constantly coming across new solutions, whether it be at an educational symposium or a conference, or vendors reaching out to us, knowing a little bit about us, our historical penchant for IT, and desire to be, maybe not at the leading edge, but at the cutting edge. We have participated from time to time in some beta type studies, some of which have been helpful for us, and some not so much. It just depends on the software, or the tech provider, in terms of how open they are to configuring or redesigning the software."*

Some IHEs actively pursue opportunities for engagement with startups as a means to stay at the leading edge of technology innovation. For example, one President referred to his IHE's membership in 1871, the "*biggest tech incubator in the US,*" as a key source of information. Sanjay Sarma, Vice President of Open Education at MIT, indicated that MIT organizes conferences for entrepreneurs as a way to stay engaged with that community. Sarma particularly values connections with small vendors because they are "*at the cutting edge.*" At University of Phoenix, Dennis Bonilla, Executive Dean, noted that many vendors make pitches to the university to have their technology integrated with Phoenix's platform because of the large scale. Joseph A. Moreau, Vice Chancellor of Technology at Foothill-De Anza Community College District, described some of the considerations involved in working with EdTech startups:

"We're in an interesting position being in Silicon Valley. There's certainly a large collection of the tried and true vendors in the higher ed space that we know have relevant products and who understand the higher ed market- Dell, VMware, Microsoft, Adobe - some of the big players like that. We have pretty close relationships with them, but we also have a cadre of startups that come to us saying, 'Hey, I was a student at Stanford,' or, 'I was a student at wherever, and here are the things that frustrated me as a student. So now I'm doing this startup and I think I've solved all the world's problems, and would you consider working with us on this?' We've done a number of those, and some have worked out. So, for example, we're working with a startup called EduNav which is run by a group of folks who have a long track record in developing successful startups that ultimately get acquired by larger organizations and are still commercially viable products to this day. We're working with them on some new approaches to degree planning.

And then there have been others that we tried and we put some effort into and it just didn't go anywhere. As we get contacted by those folks we kind of have to figure out, well, number one, is there expressed or recognized need within the organization already that we don't have a great solution for, and this might be a good match? Because, even if we find something that's super cool, if there's no demand for it among the end user community, whether it's students, faculty, or staff, then people are just like, 'Yeah, I don't have time for that. Leave me alone.'"

Lee Wetherington, Dean of Administrative Services at Lenoir Community College, emphasized the importance of a long term vendor relationship in which he could trust the vendor to be forthright about what had worked well in other implementations of a technology and what had been problematic.

Ron Hutchins, VP - IT, University of Virginia, represented the interviewees who were less inclined to look to vendors as a source of EdTech information, arguing that vendors tend to be selling a product as opposed to selling a process or an idea. According to Hutchins, he is "…*not a fan of trying to find a place to insert products into a process. I'm a fan of letting the process guide me to a product*."

Professional associations or consortia

Forty-one unique associations or consortia were mentioned a total of 77 times across 67% of our interviews. The most commonly mentioned association was EDUCAUSE, which was mentioned in 22 interviews as a source of information on EdTech products and trends, followed by Online Learning Consortium, mentioned in 6 interviews. Most associations and consortia were mentioned in one interview each. See Appendix 4 for a full list of associations and consortia identified and the frequency of mentions. Shawn Miller, Director of the Center for Instructional Technology at Duke University, described the value of being a member of small and selective groups focused on EdTech, see Box 4.

Consultants

Consultants were mentioned by relatively few interviewees as a source of information (in 7% of interviews). Despite the attraction of product-agnostic advice, affordability was clearly an issue for some IHEs. For example, Mark Berman, Associate VP and Chief Information Officer at Siena College, was a case in point: "*I wish Gartner didn't cost so much. It's a very useful service that they provide but they charge an awful lot of money for it. I can't squeeze that into my budget. And then there's other similar types of services - there's a company called* <u>NOREX</u> *that does a lot of peer review stuff, but to me they're providing for corporate users what EDUCAUSE gives me for free. There's probably no information that I would want or need that is not available somewhere. The question is, is it worth what I have to pay for it? I tend to be very leery of vendors. There is one vendor that I tend to trust and that's Cambridge Computing Group out of Boston, because they are aggressively manufacturer-independent. For example, they will never be an EMC partner for resale because they refuse to be exclusive about who they represent. They want to work with their customers and make the recommendation to the customer that's the best technology for what they need.*"

Less commonly mentioned sources of EdTech information and influence

What's happening in K-12

Dr. Preston Davis, Director of Instructional Services at Northern Virginia Community College, was one of very few interviewees who looked to the K-12 world for EdTech information: "*I try to keep a pulse on what's going on in the K-12 space. I see a real need for institutions, particularly community colleges, to understand what our future students are going to look like, what their needs may be and anticipate those things so that we're prepared for those in advance. There are a lot of interesting things that are going on in middle and high schools and we need to make sure that we know what those are because those students are going to be coming to colleges and universities with expectations based on their experience that may or may not be met by current higher education practices.*"

Shawn Miller, Director of the Center for Instructional Technology (CIT) at Duke University described two close-knit and exclusive groups of EdTech decision-makers that serve as particularly important sources of information for him on EdTech products and trends: "*There are two different groups that we participate in that are connected groups of nine or ten schools called Ivy Plus groups. These groups include the Ivy schools plus a few others that get invited to the meetings. Every subgroup runs differently. I'm a part of an older Ivy Plus group called the Directors of Academic Computing. Twice a year, I meet with other directors from Harvard, MIT, Columbia, Stanford, Brown, to talk about educational technology issues and also to share new platforms we're looking at, new technologies, outcomes of things, new trends. We only recently added Oxford and Cambridge to that, which are the first non-U.S. schools that we've been working with. We all also share a listserv. So I spend two or three days every semester measuring Duke against what other schools like Duke are trying to do. It comes in handy for me.*

Ivy Plus groups aren't centrally organized. No organization owns it. It's just a self-sustaining organism. I might not even know about it other than when I took over as director of CIT a few years ago, the previous person in this role had already been going to that, so I just basically took over. It's like a secret society. You can't go to a website and see 'Here is the official Ivy Plus with the dues.' It's more like an agreement amongst people in like-minded positions. There's an Ivy Plus for different types of research librarians. There's an Ivy Plus for people who run your student information systems. It just depends on whether you get invited to those groups and whether there's an acknowledgement that that activity is a 'thing.' Some of them don't even meet. Some of them are only virtual. We started a subgroup for Ivy Plus people involved in online course production, and that's purely virtual.

In my Ivy Plus group, we trade off on different schools that we meet at every semester. It's run by committee and, when we meet, we decide before we leave where we will meet next and what we'll do. In my particular group there's a tradition of what the agenda covers. There's a little bit of flexibility depending on the school hosting and the current trends in technology, like the year MOOCs became a big deal, that was a big discussion. Outside of that, it's always the same meeting - people updating each other on different trends and things happening, then some sub-conversations about specific new technologies or specific new directions in higher education.

My center is also part of another consortium called the Learning Technologies Consortium that is made up of totally different schools. This would be like Pittsburgh, University of Pennsylvania, Penn State, University of Georgia. Mostly bigger state schools and some other regionals on the East Coast. That's also a loosely-created organization a lot like Ivy Plus but with a different focus since they're not all made up of what you traditionally consider Ivy schools. They might just be like large research institutions. They also have a meeting every semester and a listserv that we share. So I actually have two different groups of about 12 schools and colleagues at those schools that we all share information amongst ourselves."

College students

Sanjay Sarma, Vice President of Open Education at MIT, was one of three interviewees to mention college students as a valuable source of information. Sarma believes that students provide a perspective that is lacking in the media which tends to "*target an older clientele*." Andrew Shean noted that Bridgepoint pays attention to what its students are saying on social media, and Randall Wells, Chief Academic Officer at Southwest Kingston University, indicated that he tracks information about student satisfaction that appears in LinkedIn groups.

Strategic plans

Some interviewees talked about the influence of the IHE's strategic plan on EdTech acquisition. For example, John Kolb, Vice President for Information Services and Technology and CIO at RPI, noted that his office's annual performance plan must be directly responsive to the university's long term strategic plan. Rusty Hunt, President of Lenoir Community College also talked about all decisions aligning with the college's strategic plan: "*All of our decisions are based on our strategic plan - our mission, values, and ambitions. Obviously, they're cornerstone.*"

Regulators

A small number of interviewees mentioned regulators or accreditors as being a source of EdTech information: "*One of our major sources of information is just what's going on in the realm of education as far as regulatory changes and what the government's doing, because we typically find that we spend a lot of time reacting and rolling out new technology just to deal with what's occurring in the industry around regulations. I would say Department of Ed is a big influencer of where we're getting our information from and what we're doing with that information to drive decision-making.*" (Anonymous)

Media through which EdTech information is gathered

Network events

Eighty unique network events were mentioned as media for gathering information on EdTech products and trends a total of 167 times across 93% of our interviews. The most commonly mentioned network events were EDUCAUSE conferences (identified in 24 interviews), followed by ASU-GSV conferences, (identified in 8 interviews) and Online Learning Consortium (OLC) events (identified in 7 interviews). Most network events were mentioned in one interview each. See Appendix 4 for a full list of events identified and frequency of mentions.

While the majority of interviewees listed mainstream, higher education-oriented network events, some of the more adventurous IHEs found inspiration and direction for EdTech innovation from more unusual sources, often looking more to what's coming in the future than what's happening now. For example, James A. Bologa, President and CEO, Porter and Chester Institute/YTI Career Institute talked about the Capital Roundtable Conferences such as *Private Equity Investing in Education Focused Companies*. These events allow him to see what trends are emerging from a capital side and where investors might be putting money because "*obviously, capital drives development.*" Karen VenDouern-Srba, Vice President, Academic and Instructional Technology at American Public University System, described two conferences she finds particularly valuable: "*The DevLearn conference is important because the technology is more innovative than what comes out of the education industry. The Online Learning Conference - don't get that confused with the Online Learning Consortium - is another conference I like to go to. Again, it talks a lot more about industry, technology, and how you can do training. A lot of times, government is there as well. You run into your big players, like your Lockheed Martins who are training individuals in the military using technology. A lot of times they have the most cutting edge stuff you can possibly get - if it's not classified.*"

While EDUCAUSE conferences were mentioned in over half of our interviews, some interviewees suggested that they are overly vendor-oriented and lacking in emphasis on research. For example,

Naveed Husain, Chief Information Officer at Teachers College, Columbia University: "*I send people to the EDUCAUSE Annual Conference but I haven't been to it in the last couple of years as it has been somewhat redundant - very vendor-based recently more than information or research-based. The writing is better than the conference.*" Steven Goss, Vice Provost of Digital Learning at Teachers College, Columbia University, expressed a similar view: "*I'm really a big supporter of the OLC. I think that they are probably my favorite of the bunch for professional organizations because they are focused as much on academics as they are on technology. EDUCAUSE is not, in my view. I feel like it's more vendor-focused first. I stopped going because there were a lot of presentations made by a vendor with a college and there was a lot of focus around the vendor components. That's why I selected OLC as sort of my main go to. I'd say the only one that's probably more vendor oriented [than EDUCAUSE] is Campus Technology.*" As if to confirm these observations, another interviewee claimed that EDUCAUSE is most useful because it has the largest exhibitor venue. If these observations are accurate, it is perhaps not surprising that academic research has a low profile among EdTech decision-makers given that a common source of information and influence for them does not make such research a priority. It may also be the case that some sources do not make such research a priority because they perceive less demand for research relative to information on vendors and implementation issues.

Patricia James, Immediate Past Executive Director of the Online Education Initiative, California Community Colleges, elaborated on what she finds most useful at conferences: "*The Online Teaching Conference, for us, is big. People who are using tools come and present how they're using them. If I can go to something where an instructor or a systems expert is showing something that they use and how they use it, that's really helpful. Vendor presentations, to me, don't always hit the mark because they're not always objective. I want to see what people are creating.*" Thomas Cavanagh, Associate Vice President of Distributed Learning at the University of Central Florida, also valued network events as a source of information, but in a different way: "*I get more out of the hallway conversations and sidebar meetings than I do out of the sessions at conferences. I also get a lot of interesting information out of being part of committees. That has been an evolution for me in my conference attendance practice. I used to just fill my day with sessions and now I don't feel quite as much pressure to make sure that I do hit every concurrent session block if there's an interesting conversation I can have with somebody, whether it's a vendor on the exhibit floor or a colleague, to try and understand what they're doing and just catching up. I find that particularly valuable.*"

Publications

Fifty-four unique publications were mentioned 160 times as media for gathering information on EdTech products and trends across 91% of the interviews. We categorized these publications as shown in Table 8. The most commonly mentioned publications were The Chronicle of Higher of Education and EDUCAUSE Review/publications (each listed in 19 out of 45 interviews), Inside Higher Ed (listed in 16 interviews), University Business (8), Campus Technology (7), Horizon Reports (7), and Gartner Reports (6). See Appendix 4 for a full list of publications identified and frequency of mentions.

Table 8. *Publications Read to Gather Information on EdTech Products and Trends*

Category of publications	% of interviews in which one or more publications in this category were mentioned	Frequency of mentions of a publication in this category	No. of unique publications mentioned in this category across 45 interviews
News/newsletters	62%	49	12
Partially or non-peer reviewed journals/papers	56%	33	7
Trade magazines/practitioner publications	44%	38	17
White papers/research reports	31%	23	9
Research/publication repositories	11%	5	5
Peer-reviewed academic journals	9%	4	4
General publications (other)*	13%	8	n/a

*generic mentions of publications without naming any specific item

Although many interviewees referred to print publications as a source of EdTech information, they were often criticized for being behind the curve. The CIO at a small liberal arts college described the declining value of print publications in general: "*Before I joined higher education, I worked in the newspaper business, and I will say a terrible thing. It's dying. That's tragic. I do get EDUCAUSE's Review, and I do flip through the pages, but the truth is, by the time that printed object has shown up on my desk, whatever's sitting there is already stuff I've been looking at on the web somewhere, or been referenced to via Twitter. Similar thing, the NMC, the Horizon Report, I get that. I look through it. Usually, the stuff that's in there, because it's print, it's gotten there well after I've already been thinking about whatever that is. I could probably rattle off a few other things. University Business I get. It probably comes weekly. I almost never even pay attention to it anymore. Really, print has declined tremendously in its value to me.*" Kyle Bowen, Director ETS at Penn State, expressed a similar view: "*By the time something is published, somebody's given it a name. They've given it a label and a way to talk about it. We see this time and time again. MOOCs are a perfect example of this, right? That whole concept existed for years. It wasn't until somebody had given it a name and talked about it in a different context that it suddenly became popular. If we look at the adoption curve, we're hitting the top of the curve by the time it's getting picked up in a lot of those locations.*"

Journal articles

Only four fully peer-reviewed academic journals were named as sources of information on EdTech products and trends. Two of these were discipline-specific rather than about EdTech more generally. The most commonly consulted EdTech journal, EDUCAUSE Review, is arguably a trade publication as opposed to an academic journal in that it consists of articles that are either not peer reviewed at all or are reviewed by administrators in IT-related positions. Notably absent were numerous academic journals on EdTech related issues (see, for example, the list of peer-reviewed journals provided by The International Society for Educational Technology).

Several interviewees explained why journals are not a primary source of EdTech information for them and how they prefer to make their own assessments of EdTech:

Shawn Miller, Director - Center for Instructional Technology, Duke University: "*There is good research done about certain educational technologies, but the problem is that the publishing cycle is so slow for most of it that we've already decided to do something two years before we see the research.*"

Dr. Chris Freeman, VP IT Solutions, Education Corporation of America: "*Most of our folks aren't looking for that kind of information [journal articles]; it's just not part of our culture, per se. I don't mean that in a bad way, it's just not as big a deal for us. Quite honestly, we have really good academic people. We trust our instincts, we're not afraid to do quick pilots and make quick decisions. We're more apt to go that path than to dig into, 'Okay, what does the peer-reviewed journal say and how statistically relevant is it?' It's interesting for us and sometimes it's supportive, but sometimes it just gets in the way. Sometimes you just know the right thing. You can just feel it. We're all professionals and that's why we're here - to do that kind of job, so we try to trust people with their expertise and we're not afraid to try things out and see if they work for our students.*"

Dr. Preston Davis, Director of Instructional Services at Northern Virginia Community College: "*I usually don't rely on academic journals per se. If you're looking at trying to get a pulse on what is happening or get some information about the applied technology, that's not where I see their strengths. I'm much more interested in applying technology versus the theoretical side that you find oftentimes presented in academic journals.*"

Trade publications

Trade magazine and practitioner publications, while more widely used than academic journals as a source of EdTech information, were not short of critics either. Donny Gruendler, President of Musicians Institute, was clear about his preferences: "*The only challenge with trade magazines is, by the time it's been printed, it's usually out of date. For us, the best source of EdTech information is usually word of mouth referral, in terms of who's using what, why are they using it, 'Do you have a contact phone number so I can reach out to them directly?' That's one. Two would be manufacturer websites. Three would be - it's a last ditch resort - we Google search, and fourth would be trade magazines. Very last. I probably put the least of my stock in those.*" Mark Berman, Associate VP and Chief Information Officer at Siena College, insinuated a lack of impartiality in trade publications: "*I follow the trades to a certain extent. I've been approached to write for some of these too, so I'm aware of how it's been put together. The articles in these magazines are very often in collaboration with the vendor. Maybe I'm overly paranoid and suspicious, but I prefer independent information.*"

Vendor publications

Many interviewees expressed skepticism about the trustworthiness of publications issued by product vendors. For example, Matthew Rascoff, Vice President of Technology-based Learning and Innovation at the University of North Carolina (now at Duke): "*I'll look at vendors' websites to see what they do but I would not generally rely on vendor-sponsored research for significant decisions. Phil Hill and Michael Feldstein recently took apart a Cengage survey on open educational resources practices. I trust independent analyses like theirs.*"

Social media and online communications

Social media and online communications were mentioned as a medium for gathering information in 89% of our interviews. Types of social media and online communications listed include blogs, websites, Twitter, emails, eNewsletters, LinkedIn, Facebook, Google, and listservs, summarized in Table 9.

Table 9. *Social Media and Online Communications Identified as Media for Gathering Information on EdTech Products and Trends*

Type of social media/online communication	% of interviews in which this medium was mentioned
Blogs	38%
Websites	36%
Twitter	27%
Emails	22%
eNewsletters	18%
LinkedIn	18%
Facebook	16%
Google	13%
Listservs	13%

Matthew Rascoff, Vice President of Technology-based Learning and Innovation at University of North Carolina (now at Duke), noted that social media can serve as a gateway to more traditional information sources such as journal articles: "*I look at journal articles mostly because somebody I trust links to a new paper. I read, last week, this new NBER working paper that Josh Goodman from Harvard published about the Georgia Tech online Master's program. I found it when another scholar, Matt Chingos, posted it to Twitter*." Other interviewees prefer online communications to print publications because they feel they are more divergent and forward looking. For example, Dr. Preston Davis, Director of Instructional Services, Northern Virginia Community College: "*I like the EdSurge site because they have a lot of different resources. They also have areas on emerging technologies where you can find out about things that are happening in the startup realm. I like to keep track not only of what is popular in terms of academic technology, but also what's new and maybe coming around the corner that folks may not be too aware of, and could foreshadow some interesting things to come*." Box 5 provides examples of how social media and online communications are used to obtain information on EdTech.

Despite the general predisposition towards social media and online communications as a source of EdTech information, some interviewees were clear that there can be too much of a good thing. For example, Mark Berman, Associate VP and Chief Information Officer at Siena College: "*A CIO friend of mine who does a lot of tweeting and blogging tweeted recently about his pet peeves. It was a link to his blog and he was going on and on about vendor e-mail. How his inbox and mine too gets completely clogged up with all of these cold sales reach-outs. You know, not just that, but the phones. There's been lots of conversations at the CIO level about how none of us answer our phones anymore if it's an outside call unless you recognize the number. He was complaining about the fact that the CAN-SPAM Act allows for opt-out, but his argument is it should be opt **in**. I'm a member of a number of LinkedIn groups that I*

get e-mail summaries from. If somebody asks a question, you get all the vendors chiming in, 'Oh yeah. I can do that. I can do that.' Which is sometimes useful. I admit I always take those kinds of things with a grain of salt, but it's useful to know what people think they can do. There's some other sort of marketing style e-newsletters that are occasionally useful but I've been tending to ditch a lot of those recently."

Are EdTech decision-makers operating in an echo chamber?

Our data indicates that most EdTech decision-makers at IHEs gather the majority of their information on EdTech products and trends from colleagues at their own or other IHEs. There were a few exceptions. For example, Sanjay Sarma, Vice President of Open Education at MIT, stressed the critical importance of information-gathering in MIT's approach to EdTech innovation: "*Entrepreneurs are not risk-takers. They're risk mitigators. They mitigate risk by getting as much information as possible and doing experiments*." But Sarma particularly emphasized the need for "*lateral thinking and lateral connections*" in gathering information, as opposed to relying only on the typical sources that are expected to be up to date in EdTech trends: "*Outsiders looking at the ed space in my view sometimes have a more philosophical perspective than insiders looking at the ed space.*" This view was echoed by Matthew Gardenghi, Senior Manager, IT Academic Technologies at Bob Jones University, who suggested that people less close to the problems of education often have a more helpful perspective.

In general, it appears that for-profit IHEs have a greater tendency to talk to other organizations outside of higher education whereas public and private non-profits talk more amongst themselves. For example, Greg Karzhevsky, Chancellor at Jersey College, reported that when investigating a computer-based testing system, he consulted the bar association about their experience. And Steve Rossiter, Director of IT Support at Delta Career Education, reached out to Whirlpool to inquire about the challenges it experienced in its large-scale rollout of Chrome devices to its employee base, and to ask what could have been done differently.

Box 5: *Use of Twitter, Facebook, and Slack as Sources of Information on EdTech Products and Trends*

Jonathan Becker, Director, Learning Innovation and Online Academic Programs, Virginia Commonwealth University (VCU): *"Over the last few years, I would say Twitter and Facebook have become my RSS reader. So that's how I get my news and information. I also have lots of interactions and conversations with people about different issues in EdTech using both, but much more so on Twitter than Facebook. There are people in the space who I feel are more viable nodes on my network that I'll engage with so it's more about engaging with individuals than it is around a particular hashtag or anything. Maybe this is a bad thing, maybe it's a good thing, but they are generally people who I would identify as like-minded individuals.*

I'm in three or four different Slack teams also. Slack was pitched as an email killer, but it hasn't really killed email. Instead of being organized by discussion threads, it's organized by channels. Anyone can create a channel so you can go back and forth between channels. You can start a team that has multiple channels, but you can also be part of multiple teams. It's like a walled-garden communications hub that can integrate with the broader public web.

My team uses Slack for all our communications instead of email. I'm on another Slack team here at VCU, it's a web developers' Slack team so everyone who works on various parts of the Web around VCU. They share ideas. They ask each other questions. They seek advice. Another one that's a little more active than others is around an indie EdTech team that came out of a small meeting at Davidson College about a year ago. It's really a communications hub. I love it, actually. You can integrate lots of things into it. You can integrate Google Drive. You can have things feed into it.

A lot of people that are part of that Slack team are the same people I interact with most in Twitter and Facebook. So there are people like, I say the Canadians, although George Siemens isn't Canadian anymore, but George Siemens, Dave Cormier, and Steven Downes. And then in the U.S., it's people like Mike Caulfield and Alan Levine. The indie EdTech team has one channel called Tools where people will share some of the new technology tools that they're using or trying out, it's like being at the water cooler. I think of Slack teams as one of my online water coolers."

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Matthew Rascoff, Vice President of Technology-based Learning and Innovation, University of North Carolina (now at Duke): *"I use social media constantly. I use it to see what other people are doing, to ask questions, to find reports worth reading. It's my top source of research translation. I ask about who's doing what. To take a recent example: we are exploring an API [Application Programming Interface] strategy - which is a way of unlocking data to give students and educators more control. This would allow vendors and partners to tap into student data in a secure, efficient, legal way. I recently posted a question to Twitter about who is working in this area. I got a bunch of responses from colleagues. Some direct messages, some tweets, pointing me to Brigham Young's strategy. Others directed me to a white paper by Kin Lane. Or suggested I check out what Davidson has done. That's an example of exploratory work that was pretty effective. I couldn't imagine any other way of getting an answer to that other than waiting for the next conference and kind of asking in the spotlight."*

Who are the opinion leaders, change makers, or innovation leaders for EdTech products and trends?

When asked who they considered to be an opinion leader, change maker, or innovation leader for EdTech, 42 out of 45 interviewees named between 1 and 20 organizations and/or individuals. Organizations named included IHEs, vendors or businesses, professional associations and consortia, foundations, research organizations, and non-profits. Individuals named included current or former personnel within IHEs (including researchers, academics, and administrators), business and organizational leaders, consultants, researchers at research organizations or think tanks, and leaders at foundations and non-profits.

There were a total of 66 different organizations and 107 different individuals named as opinion leaders, change makers, or innovation leaders in EdTech (see Appendix 5). The large number of individuals and institutions identified suggests there is no lack of inspiration in EdTech, but also that there is no single informed voice that influences many. Interviewees also tended to mention individuals and organizations with whom they worked closely on a day-to-day basis. As a result, most organizations and individuals were named in just one interview.

Table 10 summarizes the frequency with which different types of organizations were named as opinion leaders, change makers, or innovation leaders across the 45 interviews. The table presents the percentage of interviews in which organizations were named within each category, as well as the frequency of mentions, and total number of unique organizations mentioned from each of the categories. For example, for the category of IHEs, one or more IHEs were named as an opinion leader, change maker, or innovation leader in 29% of the interviews a total of 41 times. Twenty-three unique IHEs were named across the 45 interviews, with between zero and five IHEs mentioned in any one interview.

Similarly, Table 11 summarizes the frequency with which individuals were named as opinion leaders, change makers, or innovation leaders across the 45 interviews. The most commonly mentioned individuals were those who are current or former IHE personnel. Within this category, 65 unique individuals were mentioned a total of 76 times in 49% of interviews.

These data show both the spread of opinion leaders, change makers, and innovation leaders in EdTech, as well as their level of influence. For example, while 65 unique individuals were named, only seven of those individuals were named more than once, and the most any one individual was named was four times out of 45 interviews.

Most frequently named organizations and individuals

1. EDUCAUSE (named in 7 interviews)

EDUCAUSE is a nonprofit association whose mission is "to advance higher education through the use of information technology."[1] EDUCAUSE offers membership to IHEs, corporations, and other related associations and organizations, and provides its members with research and publications, conferences and events, and other networking opportunities. EDUCAUSE has over 1,900 institutional members, over

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[1] https://www.educause.edu/about/mission-and-organization

Table 10. *Organizations Named as an Opinion Leaders, Change Makers, or Innovation Leaders in EdTech*

Category of organization	% of interviews in which one or more organizations in this category were mentioned	Frequency of mentions of an organization in this category	No. of unique organizations mentioned across 45 interviews	Most frequently mentioned organizations (No. of mentions)		
IHEs	29%	41	23	ASU (6)	Stanford Univ. (4)	WGU (3)
				Univ. of Michigan (3)	Indiana Univ. (3)	UMUC (2)
				MIT (2)	SNHU (2)	Penn State World Campus (2)
Vendors/businesses	27%	22	20	2U (2)	Udacity (2)	
Professional associations/ consortia	24%	20	12	EDUCAUSE (7)	ELI (2)	WCET (2)
Non-profits	7%	3	3			
Foundations	4%	3	2	Lumina Foundation (2)		
Research organizations	4%	3	3			
Other*	9%	4	3	Chronicle of Higher Education (2)		
Total organizations		**96**	**66**			

* Consulting organizations or groups that produce publications or events.

Table 11. *Individuals Named as Opinion Leaders, Change Makers, or Innovation Leaders in EdTech*

Category of individual	% of interviews in which one or more individuals in this category were mentioned	Frequency of mentions of individuals in this category	No. of unique individuals mentioned across 45 interviews	Most frequently mentioned individuals (No. of mentions)		
Current or former IHE personnel	49%	76	65	George Siemens (4)	Dale Johnson (3)	Tom Cavanagh (2)
				Hunt Lambert (2)	Vince Kellen (2)	Paul LeBlanc (2)
				Clayton Christensen (2)		
Business/organizational leaders	31%	27	22	Bror Saxberg (3)	Ryan Craig (2)	David Wiley (2)
				Audrey Watters (2)		
Consultants	20%	13	4	Michael Feldstein (4)	Phil Hill (4)	Bryan Alexander (4)
Researchers/think tank personnel	11%	7	6	Stephen Downes (2)		
Foundation leaders	2%	2	2			
Other*	18%	8	8	Malcom Brown (2)		
Totals individuals		**133**	**107**			

* Non-profit organization leaders, journalists, writers, or leaders of publicly-funded projects

260 international members from over 40 different countries, and over 350 corporations.[2] Interviewees valued EDUCAUSE for its publications, conferences, webinars, and for the materials and resources available through its website.

EDUCAUSE also houses ELI, the EDUCAUSE Learning Initiative, a community of higher education institutions and organizations committed to the advancement of learning through innovative application of technology.[3] ELI was named as an opinion leader, change maker, or innovation leader in two interviews. It provides a CIO mailing list, mentioned in one interview, that enables communication and networking between CIOs at IHEs.

2. Arizona State University (ASU) (named in 6 interviews)

Highlighted for its online learning model, ASU offers over 150 online degree programs.[4] In addition to the six mentions of ASU as an institution, one or more individuals at ASU were named in an interview: Dale Johnson, Adaptive Program Manager at EdPlus; Lou Pugliese, Managing Director of Action Lab at EdPlus; Michael Crow, President of ASU; Ruvi Wijesuriya, Director of Academic Technology; and Jeff Selingo, Professor of Practice.

Michelle R. Weise, Chief Innovation Officer of the Sandbox ColLABorative at SNHU, specifically mentioned ASU's Ed Plus group: *"I personally have a good working relationship with the chief design officer at ASU EdPlus. We as a university are always curious in terms of the pilots going on there. I think EdPlus has a really interesting model where they pilot a ton of stuff, so just to see what they're looking at is fascinating."*

3. Stanford University (named in 4 interviews)

Judith Giering, Director, Learning Design and Technology at University of Virginia, named Stanford University as an innovation leader in the EdTech world because *"…they just are willing to take risks. They try things. I'm a big adherent to the whole design thinking. Go out, try something. It doesn't have to work but we can learn from it and then let's turn around and go to the next thing, and I think they embody that quite well around how they use technology and try things."*

Individuals named the most often (in 4 interviews each), included:

1. Bryan Alexander: A futurist, educator, writer, and speaker, Bryan Alexander was named as a thought-leader and convener. He produces a monthly report, Future Trends in Technology and Education, and runs the Future Trends Forum, an "ongoing, participatory and open video conversation about the future of higher education."[5]

2. George Siemens: A writer, theorist, speaker, and researcher, he is currently the Executive Director of the Link Research Lab at University of Texas at Arlington, and has his own blog, elearnspace.

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[2] https://www.educause.edu/about/discover-membership/membership-types
[3] https://www.educause.edu/eli
[4] https://asuonline.asu.edu/
[5] https://bryanalexander.org/the-future-trends-forum/

3. <u>Phil Hill and Michael Feldstein:</u> Collaborators in EdTech consulting, these two were named together in three interviews and each separately named in one other interview. They are partners at [MindWires Consulting](#), co-publishers at [e-Literate](#) blog and co-producers of [e-Literate TV](#).

What makes an individual or organization an opinion leader, change maker, or innovation leader in EdTech in higher education?

Interviewees were not asked why they identified specific organizations or individuals as opinion leaders, change makers, or innovation leaders, but they often provided explanations to justify their choices.

Roles played by opinion leaders, change makers, and innovation leaders

Shawn Miller, Director of the Center for Instructional Technology at Duke University, categorized the roles of different types of opinion leaders, change makers, and innovation leaders: *"There are people that I would consider conveners, people who bring together others to talk about issues. Bryan Alexander's been doing a good job of that. Malcolm Brown from ELI tries to do that. He's been trying to do this next generation learning platforms thing for a while.*

Then I think there are some people I pay attention to that are critical of EdTech but in a helpful way, like Audrey Watters and Jesse Stommel, who's actually right up the road from me. He runs a website called Hybrid Pedagogy, and he took over Jim Groom's job at Mary Washington when Jim Groom left. George Siemens is another one that we pay attention to.

There are research-oriented people that I keep up with, like Candace Thille from Stanford. Randy Bass we just had here from Georgetown. Mimi Ito is a person who does research around social networks and she's actually a cultural anthropologist, but she's done a lot of research around networks and social stuff. I've followed her stuff for several years. I think she wrote a book called Connected Learning a few years ago. She comes at it from the research angle. I don't think she would consider herself an educational technologist, but a lot of her research definitely has an impact on the kind of things we talk about and do.

And there's technology folks that do really cutting edge stuff, like Kyle Bowen who's at Penn State now and was at Purdue for a long time.

There are teaching-focused people like Eric Mazur.

There are open education technology people like David Wiley, and after that, for me, it gets more into my colleagues and friends from the different schools like the Ivy Plus group."

Solving common challenges in teaching and learning

A few interviewees spotlighted individuals or organizations that were pioneering ways to use technology to solve common challenges in education, for example, through the use of adaptive learning technologies. Karen VenDouern-Srba, Vice President of Academic and Instructional Technology from American Public University System, identified Realizeit as a particularly innovative company: *"Realizeit is an adaptive product, and their engine is spectacular. Everything that I throw at them, even with the various interactive pieces that we put into our lessons, they work with me and are just as innovative*

about figuring out how we can combine student success and pedagogy." Similarly, Ami Bhandari, SVP of Education and Strategy at Lincoln Educational Services, singled out McGraw-Hill for its adaptive learning textbook technology, McGraw-Hill Connect, which the company created in collaboration with a European company, Area9.

Some interviewees admired organizations striving to offer solutions for non-traditional learners who require a more flexible learning environment. Donny Gruendler, President of Musicians Institute, spoke about the value of leaders in learning analytics: "*Any sort of LMS like D2L's Brightspace that's doing learning analytics, I think that's really the future. To be able to say, 'All right, you failed your quiz on week three and week five. When you do those things, then your probability of passing is X. Therefore, you have to do X, Y and Z.' To help students complete their degrees, and giving them feedback versus, 'You failed the midterm, there's nothing you can do. See you next semester.' Other change makers are those that make digital content more accessible. We've also partnered with Non Linear Educating - they're developing ways of educating in a non-linear fashion, almost like stackable certificates. They build content for everything from audio and video to Microsoft Word tutorials. I think a lot of what they're doing is the future for higher ed because I think today's learner doesn't always see the value in a four year degree, but they know how to stick around in a non-linear fashion.*"

Interviewees at four IHEs explicitly acknowledged the faculty within their own institutions as opinion leaders, change makers, or innovation leaders. For example, Kyle Bowen, Director ETS at Penn State, asserted that some of the university's faculty "…*are absolute pioneers in the things they're doing.*" Robert Heinrich, Chief Information Officer at Stockton University, described how Stockton actively cultivates faculty as a source of EdTech inspiration: "*We do have some pioneers internally - a number of faculty that are on the cutting edge. For example, years ago they were the first to want to get a 3D printer on campus, have drones, and build makerspaces on the campus. Our faculty were extremely innovative and they really helped to initiate the acquisition of proof-of-concept technology solutions. The Division of Information Technology Services will usually provide some seed money to allow them to experiment and develop proofs of concepts which I believe is really a good model to have. There's a proposal and application process. If the faculty is successful in having their application approved, they'll get roughly a thousand dollars towards the project. I have more of an informal fund that I use for folks when they come to me. We also have a more formalized program that is run out of our academic affairs department that allows faculty to apply for funds to try things. We call it the Integrated Technology and Engagement through E-learning, or the ITEE. I'll just give you the URL if you're interested in looking at the website*: https://stockton.edu/elearning/itee.html." Note that, speaking of good models, Stockton's ITEE application form (available at the bottom of the web page) requires the faculty member to address student benefits ("*How do you anticipate that these activities will enrich student learning, engagement, and/or achievement?*") and assessment ("*How do you plan to assess the outcomes and benefits of this project*?").

Organizations with rigorous decision-making processes

Paul Foster, Director of eLearning Technology at the University of Cincinnati, appreciates the rigorous EdTech evaluation processes employed by collective purchasing organizations, and by some individual IHEs, and watches their decisions for applicability to his own IHE: "*Western Governors is one, MICTA, and WICTA. They're collective purchasing organizations which means schools are partnered together, typically once a topic has really become somewhat mainstream and it has a universal appeal. So if they go through that process it's often well researched as to why they're making those decisions. For example, when considering the LMS, Georgia went through a really robust evaluation process recently, and they*

contacted a lot of schools and they published a report because they were making a decision for the state. Several years ago Virginia did something similar."

Sources of big ideas

Ron Hutchins, VP – IT, University of Virginia, was also more likely to be influenced by ideas that had been filtered for importance: "*I'm more interested in the things that show up on the TED talks, like the Khan Academy. That's information that's been vetted by a larger community and condensed down into a presentation that is not a technology pitch. It's more about process*."

Driving costs out of the system

James A. Bologa, President and CEO of Porter and Chester Institute/YTI Career Institute, suggested that opinion leaders, change makers, and innovation leaders can also be "*anybody who's helping to try to drive costs out of the system... At the end of the day, there's a lot that has to change in order for us to get to a truly different place*." For Bologa, innovation leaders are those helping to make the educational system more efficient, and he cited Udacity and 2U as examples.

Looking to the future

John Kolb, CIO and VP of Information Services and Technology at RPI, singled out the value of researchers in identifying technologies of the future: "*I certainly spend a lot of time with various IBM colleagues in their research center. A lot of what I find useful for my activities is when I can interact at the research level. I can get an insight into where things might be going a little bit more over the horizon. I'm not as focused on the one- or two-year out, I'm more worried about five-plus years out*."

Who's missing in the line-up?

Despite the apparent abundance of inspiration on the EdTech front, Prof. Phillip Long, Associate Vice Provost and Chief Innovation Officer at the University of Texas at Austin, pointed to one source of influence that should be present but is missing: "*In my view, there aren't that many people in positions of leadership at universities, broadly speaking, that I would also call EdTech leaders. This is unfortunate. I think that's an issue, frankly. I suspect the reason is because 80% of their job is quieting the fires on the home-front, and as a consequence the people that end up taking those positions are more internally-focused than externally-focused. Not too many institutions are willing to pay for externally-focused leaders because they don't see the value proposition of the external view related to EdTech relative to whatever they consider their internal challenges to be. There are some notable exceptions, but the exceptions underscore the overall sentiment.*"

Bror Saxberg, one of our Working Group members, reviewed the compiled lists of opinion leaders, change makers, and innovation leaders for EdTech products and trends suggested by our interviewees, and added a few more of his own, see Box 6.

Box 6: *View from Working Group B on EdTech Influences*

Bror Saxberg reviewed the compiled lists of opinion leaders, change makers, and innovation leaders for EdTech products and trends and suggested a few more of his own…

Professional societies: The Society of Actuaries is trying to do more learning-science grounded work. So is the CFA Institute. Deans for Impact - an association of schools of education - are working to incorporate learning science into education school curricula as well as use of measured success of teachers after graduation to give feedback/make changes to education schools.

Vendors/businesses: Wisewire does a mixed set of high quality assessment development and course development, all informed by learning science. Lea(R)n is another vendor that's helping keep score on RCTs within higher ed settings as well as high quality course reviews. Reasoning Mind, an elementary to middle school math program provider has been using learning science and participating in RCTs for quite a while.

Foundations: The Chan-Zuckerberg Foundation is planning to be very supportive of evidence-based approaches.

Non-profits: Transcend Education, a not-for-profit that helps folks building reform models of learning in K-12 to incorporate successful practices, including good learning science and good evidence-gathering practices.

Consulting: McKinsey has been supporting a number of projects on evidence-based learning over time.

People: IHEs: Craig Roberts at Duke has done a lot of good work on applying learning science at scale. Karen Wilcox and Sanjay Sarma at MIT were behind last years' OEPI report, a compendium of learning science research. Henry Kelly at University of Michigan has been helping drive some interesting learning analytics work as part of their recent large data sciences initiative. Phillip Long at UT Austin has done a lot of work around the globe on EdTech innovations, grounded in learning science. Ken Koedinger at CMU is a very important practical researcher in EdTech - another in the US is Richard Clark, emeritus at USC School of Education.

People: Companies: Ulrik Christensen of Area9 has done major work (including with McGraw-Hill) on evidence-based adaptive instructional design. David Porcaro, Director of Learning Design at Pearson, was behind a recent release of evidence-based learning design standards.

People: Foundations: Jim Shelton from Chan-Zuckerberg Foundation.

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Part III. Participants and Processes for Decision-making

Differences in the EdTech decision-making process arose most markedly between for-profit IHEs and non-profit IHEs. At non-profit institutions, decision-making tends to be protracted, inclusive, and consultative with faculty having a strong voice in decisions in addition to professional staff and, in some cases, students. Decisions about technology that could affect the entire campus are often subject to existing faculty governance processes with the formation of committees and taskforces, which are never known for being expeditious. The personnel hours (and hence costs) involved in these intensive and lengthy deliberations can be staggering. At some non-profits, interviewees asserted that EdTech decision-making for anything other than major acquisitions is decentralized to the point of inefficiency. For-profit IHEs tend to have swifter, more centralized or top-down decision-making processes with faculty and student buy-in often sought only after a decision is made (See Box 7). Interviewees who had worked at both non-profits and for-profits did not feel that efficiency was always the most desirable trait of decision-making processes because of the importance of building buy-in from users before surprising them with new technology.

Despite variations in timelines, the basic steps involved in the decision-making processes were fairly similar across institutional types: identify the technology options currently available that serve the intended purpose, participate in demos, run a pilot, and proceed to scale-up (or not). Part IV of this report provides extensive detail on how technology options were evaluated for the decisions discussed in our interviews. At for-profits, a decision about which option to purchase was usually made before conducting a pilot. The pilot was used as a way to test-drive implementation procedures before ramping up to full-scale rollout. At non-profits, the pilot was ostensibly used as a way to gather input from faculty and students, and to assess student outcomes before deciding whether to adopt the technology. In practice, a few interviewees noted that once a product is piloted it can be hard not to continue with it unless the results are disastrous.

Differences between public and private IHEs, 2-year and 4-year IHEs, and small vs. large IHEs were less dramatic. Public institutions must issue RFPs for purchases over a threshold set by the state and must abide by other state regulations. For example, in Utah, selection committees reviewing RFPs are not permitted access to cost information which is only available to the purchasing department. However, the award must be made to the lowest bidder. Despite being subject to fewer (or different) regulations, most private institutions also issued RFPs for sizeable technology purchases. Larger IHEs were more likely to have personnel dedicated to a variety of roles that support EdTech decision-making and use, such as staff responsible for systematically gathering and synthesizing information about technology options and applications. At for-profit companies that encompass multiple IHEs, EdTech decisions are often made centrally for the entire system. In public systems such as community college or state university systems, a few decisions are made at the system level. These add another layer on top of campus-level decisions, but individual campuses are often given a choice as to whether to adopt the technology or pursue their own solutions.

Decision-making processes also varied depending on the size of the purchase, how widely it would be implemented, and the speed with which the technology had to be in place. As might be expected, smaller purchases affecting fewer stakeholders, such as the purchase of MathLab or a Musical Instrument Digital Interface that would only be used by a School of Music, and those that needed to be implemented swiftly, bypassed many of the steps that accompanied a significant, enterprise-wide acquisition such as an LMS. In some, but not all, cases, any purchase made at a faculty or departmental level must still pass through a security and data governance review by IT.

The role of IT in EdTech decision-making varied across IHEs from originating EdTech solutions that were then pushed out to the faculty and other users, to responding to user needs by identifying a short list of potential options from which the users could choose. Naveed Husain, Chief Information Officer at Teachers College, Columbia University, notes that the role of IT has been evolving "*from a support organization to more of a strategic partner or enabler*." Other interviewees described the changing role of IT as EdTech choices are more frequently made by individual faculty and departments.

Box 7: *Decision-making at For-profit vs. Non-profit IHEs*

Randall Wells, Chief Academic Officer at Southwest Kingston University (based on 18 years of EdTech decision-making experience at both for-profit and non-profit IHEs): "*The decision-making is different in a for-profit than in a not-for-profit. At for-profits, things are looked at from a bottom line, a return on investment approach and much of what might take months of discussion in a not-for-profit setting are not even on the board for discussion because we're not taking the approach of, 'What's in the best interest of the humanities and how are we going to change the world?' It's 'What's going to give our investors the return that they are expecting?' otherwise they are going to flip the whole thing. The drive and motivation is much different.*

At for-profits you do not have to have the level of consensus-building that you do in a not-for-profit traditional higher ed setting. It's not decision by committee or decision by faculty senate. That piece is removed. Not to say that opportunity for input isn't given. A lot of times in the traditional not-for-profit educational setting, whether it's a state school or private school, the model generally is: everyone gets their say and the majority gets its way. On the for-profit side, depending on the company, the opportunity may be given for everyone to have their say, but that may have nothing to do with what the decision is. If the opportunity is given, usually the intent is to get buy-in because those folks are going to be the end users and we want to make sure that it's something they can work with. But, at some for-profits, the decision is made based more on budget and economics versus 'Do you think the faculty is going to like this or not?'

Don't think for one moment that I'm telling you the best thing is to just make a top-down decision and be done with it. That's very efficient. It may not be productive, but it's very efficient. The for-profit model moves a lot more quickly and is much more nimble. It's 'Boom here's what we're doing.' What took me a year and a half to implement in another institution, took me a month to implement here.

My own experience tells me that the best way to approach it is to solicit feedback because the more people that you have putting eyes on something, you're probably going to come across something that a small group of executives may miss because they are going mostly by what the vendor is telling them.

The biggest difference I notice on the not-for-profit side, is that faculty give very little thought to costs. They're just not attuned to the fact that there are limited resources and we have to produce results based on those resources. In a for-profit system, even though the faculty may not be actively involved in decision-making, they are keenly aware of the business model."

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Decentralization of decision-making and the changing role of IT

Shawn Miller, Director of the Center for Instructional Technology at Duke University, observed that EdTech choices are increasingly being made by individual faculty and departments: "*There's a trend where some EdTech purchasing or decision-making is happening at a department or individual faculty level. It's a new thing that's been happening since Web 2.0. Vendors can approach an individual faculty member and get them to start using something. They'll use it just for their classes, but they've essentially just made a deal. It's not a university-sanctioned deal, but our university is pretty flexible to let people do mostly what they want within reason. The individual faculty can basically make those decisions for themselves. On top of that, departments do that often. Our chemistry department uses a certain assessment technology that we don't support from an enterprise level, but they use it.*"

The CIO of a small liberal arts college also noted a shift over the past 20 years in the way faculty and students consume technology. If the institutional technology solutions are not meeting their needs, they find their own and make individual purchases, paid for with grant funds, departmental funds, or their own personal money. For example, this CIO reported that "*The fact that our faculty are willing to pay for Dropbox, even though the institution is providing them free Google Drive and free storage in the data center, tells us something that we need to acknowledge.*" These user choices are driven by user experience rather than considerations of security or cost efficiency. This results in a concomitant need for IT to relinquish its role as primary gatekeeper of what EdTech is used and to act more as an advisor

Box 8: *What is the Appropriate Role of IT in EdTech Decision-making?*

CIO at a small liberal arts college: *"I have a somewhat unusual set of opinions related to what's driving technology choices. I'm going to abstract that as user experience trumping many other considerations. This business you hear of bring your own device, or bring your own software, or shadow IT, is in no small part driven by user experience. Our decision to provide Dropbox college-wide was driven by the recognition that, because the college-provided storage solutions, which required use of VPN [Virtual Private Network], were so cumbersome that they inhibited collaboration, our faculty and students were simply finding other storage solutions on their own. When I started looking at what these were, the largest proportion were individual licenses for Dropbox.*

The faculty were using their research funds, or they were petitioning their Departments for funding, or they were using grant funds to purchase individual or commercial licenses for Dropbox, and then bringing their students in using that. A normal business would have a single corporate relationship with Dropbox, and we had nine of them, because nine separate faculty or departments had gone and forged that relationship with Dropbox. So what was driving the college's decision was the recognition that user experience was causing users to not use a resource that we were spending a lot of money on, because it wasn't really up to the tasks that they needed to use it for. I had to find a better way to furnish collaborative file space for faculty and student use for research and courses.

Prior to my appointment as CIO, there had been this historical relationship between the controller's office and IT, where IT would say, 'No, that's not a legitimate use of funding,' and the controller's office would then tell the faculty they're not going to reimburse them. I more or less put a stop to that when I became the CIO. Again, I'm a little bit unusual I think, and certainly some of my colleagues think I'm a bit crazy in the way that I think about this, but it's back to user experience. To my view, Software as a Service [SaaS], and these shadow IT choices are a sea change in the way that institutions take care of their business processes. IT is not going to be left in the traditional role of the gatekeeper on access to technology, and instead has to recognize that we have to go to where our customers are driving the business, and not try and say the customers have to be driven to where we want them to be. It's basically impossible to get them there.

CIOs at other IHEs often think that issues around security and fiscal responsibility mean that it's imperative that IT controls the decisions, or is an effective participant in these decisions about what choices to make, and that sunk costs in the data center mean that it's fiscally not prudent, for example, to go license Dropbox. You've already invested in your infrastructure, and that basically the college should use policy to drive use of the infrastructure. I think that flies in the face of what, as a practical matter, is happening. It's not twenty years ago when the end user really wasn't sufficiently aware of how IT systems work, and wasn't really capable of making decisions about what was going to work best for them. We live in a different world now, and the users often are much closer to their day-to-day work, whether it's teaching, or some other business process of the college and we have to take into account the choices they're making, and the reasons that drive those choices. I'm not unaware of the security implications. The frank statement is I've exposed the college to a little more risk in the service of making things work better for the users who have to use the tools. Not everybody's happy to hear me talk about how IT needs to let go of control a little bit. There's a coda to that which is, by letting go of control and demonstrating that I'm an effective partner in decisions about what's going to work best for the department, I have more credibility in these conversations when I really do need to say, 'I don't think this is the wise choice.' That was an intentional strategic decision on my part. I anticipated that being the case. We're not quite there yet, but we're getting there, turning the corner in terms of the community's perception of what IT's role is in governance and in IT decisions."

and facilitator, while still trying to ensure that regulations are not breached (See Box 8). Furthermore, even when it is clear that an enterprise-wide solution is necessary, at institutions with strong faculty governance, the role of IT goes beyond facilitating choices based on technical merit. It is also necessary to make a major effort to build faculty support and buy-in: "*You're going to get sunk if either a large enough quorum of the faculty don't agree with something, or the most politically influential faculty don't agree with something. Navigating that is this constant task, in relation to any of these choices*." [CIO of a small liberal arts college].

Timelines

Many interviews complained about the mismatch in speed of change in technology and the speed with which decisions are made at non-profit IHEs. Prof. Phillip Long, Associate Vice Provost and Chief Innovation Officer at the University of Texas at Austin, discussed a decision about how to classify clickers in order to address state regulations that prohibit public IHEs from charging students for fees above tuition: "*Faculty governance is a deliberate process. In the face of technology change this can be incredibly slow. Most governance committees meet three or, at most, four times a year. They make a recommendation at the end of the year, so everything happens on an annual basis. This decision took a year and a half. Nothing happens much faster than that.*" Shawn Miller, Director of the Center for Instructional Technology at Duke University, expressed frustration that budgeting cycles can be an obstacle in EdTech decision-making: "*Higher ed moves so slowly - I really need to have decided now if I'm going to spend money next year on anything. I just turned my budget in yesterday. If someone comes up with the world's best X that everyone wants, it's possible that I'll have wait a year and a half before I could even entertain that thought.*"

When speed was of the essence, the selection decision might be made based on prior knowledge of options available or prior use by the key decision-maker. For example, Musicians Institute chose Hudson Music to help develop their digital curriculum without considering alternative vendors because it was a known and trusted entity and the key decision-maker was confident the company would deliver on the planned but aggressive timeline. Such a major decision at a non-profit, and especially a public IHE, would have been far more deliberative. For smaller, targeted investments, unilateral decision-making does occur even at non-profits. For example, Steven Goss, Vice Provost of Digital Learning at Teachers College, Columbia University, had little hesitation in his choice of Articulate's Storyline to develop online modules: "*I'm an Articulate developer so I just knew the tool and I went with what I knew because of time constraints and capacity. This project has to be done by December. I knew what it could do, I knew that if we brought in an instructional designer and they couldn't complete the project, I could do it if I needed to.*"

In general, decision-making at for-profit IHEs is much swifter than at non-profits. Andrew Shean, Chief Academic Learning Officer of Bridgepoint Education, portrayed the difference with a graphic metaphor: "*I'd say it's probably seven months from soup to nuts, to make the [LMS] selection. Our previous president was the Chancellor of University of Maine's system. When he came here, he said the difference was like between driving a cruise ship and driving a sports car. Kind of good and bad. You could make bad decisions really quickly.*"Ami Bhandari, SVP of Education and Strategy at Lincoln Educational Services, which operates 28 campuses across 15 states provided an example of a decision made at lightning speed:

"We teach a diesel mechanic training class where we basically train students how to maintain diesel engines and tractor trailers, or the tractors themselves. It's about a 13-month program and we've been teaching it for years using basically a textbook and labs. It's 50% lecture and 50% labs. Based on the success that we had had in the previous year with putting EdTech into our automotive maintenance program, we decided to introduce EdTech into our diesel mechanic program.

There were two vendors out there that offered compelling products. One was a vendor that we had used for 20 years, and then we had this new vendor with a new product. What we basically did was we identified the vendors and we let them know that they would be competing to sell us this product. We held a meeting up here at our corporate offices where we engaged the four pillars: IT, operations, education, [and the business office], and then we invited and flew out supervisors from different campuses to participate in the decision-making process. Then we had the vendors come out. I think we had one present for a couple hours in the morning and then another one present for a couple of hours in the afternoon. Based on our experience with them, looking at our own rubric of what we were looking for, we made a decision by the end of the day of which way to go."

Dr. Chris Freeman, VP IT Solutions, Education Corporation of America, described a somewhat different but also relatively streamlined decision process:

"This is probably where, in the for-profit school space, we don't have quite as many regimented hoops that we have to jump through as traditional schools, so we do make decisions pretty quickly. When we are considering an EdTech solution, I will do most of the legwork and try to bring our key stakeholders in Curriculum, Academic Affairs, and Finance together for a 'discovery' meeting. We really try to keep those to a minimum. If it's a super complex decision, and it's clear we're not getting consensus early on, then this'll drag on. Usually we have one or two discovery meetings to determine the requirements that we're after. Then it's my job as Vice President of IT Solutions to go off and summarize all of the requirements, and do what we call a 'concept for review.' We lay out what the request is, what problem we're trying to solve, what's the current state of affairs, what is it we want to accomplish, how much it's going to cost, and what we expect to get out of it. Then everybody gets a chance to look over that. If I need input after the first one or two discovery meetings, I'll just do one-off meetings, but then everybody gets to go back to doing whatever they're doing until it's time for review. At the review session, each person gives a thumbs up, a thumbs down, or 'I didn't quite get it, let's tweak something and then we go.' We try to do that relatively quickly. We don't want to hem and haw around too long."

Examples of decision-making structures and processes

Box 9, Box 10, Box 11, and Box 12 each provide an example of EdTech decision-making processes at different types of IHE. The first example is from a for-profit IHE, the second from a small, private liberal arts college, the third from a small public university, and the fourth from a large public university. At the end of Part III, Box 15, *Lessons from Down Under*, outlines EdTech decision-making practices at Monash University in Australia, describing a recently overhauled and streamlined approach that U.S. IHEs could learn from. Processes vary by how formalized or ad hoc they are, the levels of governance involved, how stakeholders are engaged, and the types of decisions being made. However, they all share some elements such as a hierarchy of committee structures and a key role for IT in vetting options.

Box 9: *Decision-making Processes Example 1: For-profit IHE*

Andrew Shean, Chief Academic Learning Officer, Bridgepoint Education: "*This is where our environment gets kind of fun. We're set up uniquely. We have two universities: Ashford University and University of the Rockies, which are independent. They have their own board of trustees. They each have a president and a provost and faculty and governance. That being said, as the mother company, we have quite a few centralized shared services. My team is one of those services and we are really in front of products, curriculum, and EdTech.*

How do things actually work? For something significant like the adoption of a major tool - the LMS decision is a good example - we recently set up an advisory committee and a steering committee. Then we had an executive committee. The executive committee consisted of a president of each of the universities, as well as our Bridgepoint executive team, so the CEO, the CFO, the CIO, the CAO, Head of Marketing. That team ultimately, in consultation with the relevant board, has the end of the day decisions.

The steering committee consisted of high level stakeholders from across the organization. We had a head person in Business Technology Services. The head person in procurement. We had both the provosts of the universities. We had faculty representation from each of the universities. We had our AVP of curriculum instructional design. There were probably about 12 people. I led it as the Chief Academic Learning Officer, but I did so in very close collaboration with our tech department and CIO. That steering committee is ultimately where the heart of the work existed. We would go to the executive team for a final yea or nay as well as consultation, of course.

The advisory committee was a much larger, expansive group. About 35 members. They consisted of directors and managers and student-facing teams and marketing, a more broad brushstroke of the organization. Part of the purpose was informational, just sharing with them where we were and getting their ideas and their comments and their feedback. As we got closer to a decision, we really wanted them providing and recommending things with the caveat that we were giving them the opportunity to really have their input heard in a more formal way.

Then we put together a plan where we sort of think of it like a funnel. We started with a scan of the entire LMS sector. We then brought in a Gartner consultant to really give us a deeper sense. Then we whittled it down to seven options based on a rubric, a set of criteria that reflected what we were looking for. We had seven people actually come out and do presentations as well as some quick, in depth technical dives. That got us down to three. That really initiated the RFP process.

Those three each put together pretty significant presentations and held a series of meetings with the faculty. We had a webinar for all of our faculty and demos so they could give feedback physically on-site. Then, based on everybody's feedback which we consolidated, the steering committee's analysis, the rubric results, and the advisory committee's input, we put together an overall recommendation. That's what generated our selection.

If we're choosing something that's not quite as monumental, what you would typically have is that our team would really vet the options. As we see things that are happening out in the industry, we'll have people come and visit. They'll do presentations. It'll obviously have to be aligned to our strategic goal, solve a problem we're looking to solve. Then what we would typically do if people have interest, is we

would pilot. In that pilot we would determine the efficacy or the ROI. That would then be presented to academic and then corporate leadership and would ultimately yield a decision to go forward and to what extent. That would be a quicker, streamlined version of the process.

Then there's your everyday stuff where faculty's developing a course and they want to use X resource. We try our very best, with some level of consultation, to empower our faculty to be able to make those decisions. The caveat is there is absolutely a list of things that are deemed okay - we have certain vendors with corporate contracts and much more streamlined processes to do business with. If people are going to want to seek an outside agency, there are criteria that they have to meet. Obviously we're online, we're at scale, they're going to have to integrate with our systems. They're going to have to meet accessibility standards. They're going to have to be cost-effective, right? Those kinds of things would cause them to be a go or no go. We have a small products team that actually initiates that process and takes the faculty or the program or the college through that procurement process. Faculty can initiate it when course development begins by reaching out to our team. In these cases where a faculty member wants to use, say, an adaptive lab, assuming the product meets our basic criteria and the faculty really wants to do it and it's at small scale, we're going to do everything we can to make them happen."

Box 10: *Decision-making Processes Example 2: Small Private Liberal Arts College*

The CIO at a small liberal arts college outlined several layers of governance with respect to EdTech decision-making but still described the process as ad hoc: "*I know that we're not unique in what I'm going to try and relay to you. We are very inefficient and have ad hoc processes. There's often not the level of formality and rigor with the way that we approach things that one might think you would find. To be specific, the governance of IT at the college is firstly up to me and senior staff who report to the President. That's a weekly meeting. The Dean of the Faculty also sits there, Dean of Students, and others who might choose to weigh in on a choice about a technology purchase. That's the first layer of governance.*

The second layer of governance is the Faculty Computing Committee - the Librarian of the college, an Associate Dean and faculty sit in that committee, as well as myself as CIO and my Director of Academic Technology. The Dean of the Faculty appoints three faculty to that committee. That's an every other week meeting. Any consequential IT initiative gets discussed and vetted by that group. They don't have decision-making authority but their opinion weighs heavily in decisions.

We have very strong faculty governance so I also have a direct relationship with the Dean of the Faculty. I've been fortunate, two Deans in my time at this college, good relationships with both of them, good collaboration, candid discussions about choices. Similarly, I work very closely with one of the Associate Deans of the Faculty.

The last consequential thing has to do with finances. If I'm going to make a choice, that goes through the budget process and the Chief Business Officer of the college. Typically, it's the Dean of the Faculty and the CIO saying we need to do X, Y, or Z, and then we get the money to do it. It's not universally true elsewhere that other business units get as easy access to funding as academic priorities do."

Box 11: *Decision-making Processes Example 3: Small Public Four-year IHE*

Robert Heinrich, Chief Information Officer, Stockton University: *"The first step [in our decision-making process] is identifying the functional requirements. What is the business need, and what are the problems that we are looking for a solution to address? The second is to evaluate potential solutions to solve these issues. After we have completed our evaluation and received proposals, we must thoroughly review the proposed solutions and the pricing and make a budget request in order to proceed with the implementation. As part of the budget request, we also promote across campus to gain key stakeholder backing for making that investment and ensuring that this is a solution that is really going to meet the needs across the institution.*

For the governing aspect, we've got three different structures. How a decision is made depends on who the decision affects; what type of solution we're looking to acquire, like whether it's more of a change in business practice and policy; and the overall dollar amount.

First we have central IT, which is my division. There are four departments within IT, each with their own directors. We have a number of initiatives that are vetted directly by that management team, possibly needing my final approval depending on the dollar threshold. If it's a significant budget request, it becomes part of IT's request for our next fiscal year funding and that's decided at the cabinet level where I sit. That's one entity.

The second is our Faculty Senate Technology Subcommittee which decides on projects outside of our department. That group is part of our shared governance that meets several times a year, and we work on new initiatives and problems and policy review more from the faculty governance perspective.

Lastly, I have an Information Technology Advisory Board which has diverse representation from all the divisions across campus. There are higher level managers across the different departments on campus: there's student affairs, development, academic affairs, administration and finance, university relations and marketing, and then our Chief Planning Officer from the President's office and a student representative. [See https://stockton.edu/information-technology/information_technology_advisory_board.html*].That group has key stakeholders who bring project ideas that are then vetted through the advisory board. The advisory board also helps with prioritization of project implementations."*

Box 12 . *Decision-making Processes Example 4: Large Public Four-year University*
Flow of Enterprise-level EdTech Decision-making at University of Cincinnati (UC):
Review of LMS

Based on interviews with: Chris Edwards, Assistant Vice President for eLearning, University of Cincinnati (Co-chair of eLearning Committee); Paul Foster, Director, eLearning Technology, University of Cincinnati (Co-Chair of LMS Taskforce); Tina Meagher, Senior Video Strategist, University of Cincinnati (Subject Matter Expert for eLearning Committee); and materials available at IT Governance which notes that "More than 350 student, faculty and staff representatives attend monthly meetings and serve as part of university-wide IT Governance." The University of Cincinnati (UC) is a comprehensive public research university located in Cincinnati, OH. It serves around 45,000 students across 14 colleges and is part of the University System of Ohio.

Bolded items in purple are decision-making bodies

Step 1. EdTech issues and ideas are surfaced through five Topical Committees

IT Managers Committee
eLearning Committee
Information Security and Compliance Committee
Research & Development Committee
Core Services and Shared Infrastructure Committee

Each of which meets monthly and include:

Undergraduate and graduate students
Faculty
Administrative personnel
College leadership (Director level)
Instructional technologists (IT)
eLearning personnel
Instructional designers

Ideas can be submitted using an Initiative Request form by anyone at UC - college leadership, individual faculty members, students, or staff. Initiative Requests are forwarded by **Topical Committees** to **IT Council Advisory Committee.**

In 2015-16, the **eLearning Committee** surfaced concerns about the roadmap of UC's current LMS vendor.

Step 2. Vetting of ideas is executed by the IT Council Advisory Committee
Consists of 11 people: CIO, Chairs, and Co-chairs of each of the five **Topical Committees** listed above. This committee serves a gateway function to prioritize effort spent on EdTech initiatives. Considerations include:

Does this align with the university priorities?
Does this align with the UC vision?
Is the request sufficient in its current form?

Are there proper pledges assigned to it?
Do the other governance groups need to vet and provide feedback on the idea before it moves forward?

Decision point:
IT Council Advisory Committee decided by majority vote to create a taskforce to pursue **eLearning Committee's** request to review UC's current LMS, and examine how the vendor roadmap aligns with UC's.

Step 3. Create temporary taskforce or working group: LMS Taskforce

Size of a taskforce and time spent on a decision are "*commensurate with impact to the institution*." For the LMS review, a taskforce of 23 people was initially established, mostly consisting of IT staff and Instructional Designers. **LMS Taskforce** conducted an initial evaluation of the current LMS vendor's roadmap and other LMS options.

Decision point:
LMS Taskforce comes to a consensus by discussion to recommend i) conducting a market scan of LMS options and ii) adding additional stakeholders to the taskforce. See 3-page letter from **LMS Taskforce** to **eLearning Committee** in Online Repository which justifies these recommendations.

The **eLearning Committee** is a standing group of 20 people that meets monthly and includes:

Student representatives (reps)
IT reps
Instructional designers
Administrators from Learning Support, Center for Enhancement of Teaching and Learning, and Libraries
Faculty and faculty senate reps

Plus chairs and co-chairs of 5 eLearning sub-committees:

Accessibility eLearning Sub-Committee
Analytics eLearning Sub-Committee
Instructional Designer eLearning Sub-Committee
Online Learning eLearning Sub-Committee
LMS eLearning Sub-Committee

Decision point:
eLearning Committee reviews **LMS Taskforce** recommendations and accepts them by majority vote.

Step 4. LMS Taskforce is expanded to include additional stakeholders

Faculty
Students
Center for Enhancement of Teaching and Learning staff
UC Libraries staff
Risk Management
Information Security staff
Leaders of 14 individual colleges

An experienced Project Manager is assigned to facilitate the review process.

Step 5. Expanded LMS Taskforce conducts market scan and evaluates LMS options

Resources consulted include LMS market scans by EDUCAUSE and Gartner. Questions addressed by **LMS Taskforce** include: What are the options available? How would they scale across the institution? What is the funding mechanism? A comprehensive report of findings is issued.

Decision point:
LMS Taskforce comes to a consensus by discussion to recommend development and issuance of an RFP (Request for Proposals) to gather information about LMS options and piloting costs.

Decision point:
eLearning Committee accepts **LMS Taskforce** recommendation by majority vote.

Step 6. RFP is developed and issued

A 10-person sub-group of the **LMS Taskforce** spent one month drafting an RFP and sharing it with the full **LMS Taskforce**, with the **eLearning Committee,** and with Purchasing.

The final RFP included 15 categories of criteria to be used for selecting an LMS, 209 criteria in total. Some items were mandatory and some optional. See RFP in Online Repository.

Decision point:
10 people from **LMS Taskforce** volunteered to weight the importance of each of the 209 criteria 1, 2, or 3 prior to issuance of the RFP. These weights were agreed by consensus in a 2-hour meeting.

Step 7. LMS Taskforce implements a communication strategy with UC community

A website is developed to communicate rationale and process for LMS review and to invite participation.

eLearning Liaisons meet regularly with leadership of each of 14 colleges to share information about LMS review and to solicit feedback.

eLearning communicates progress with IT Managers from each college and unit across campus.

Step 8. RFP responses are received and scored

UC received 5 bids from 4 vendors, each around 1,500 pages. Ten people from **LMS Taskforce** (mostly the same team that earlier weighted criteria for importance) volunteered to score each RFP using a scale of 1-5 for each of the 209 criteria. This process was begun as a group and then continued independently. Initial scoring was for required criteria only. Scores from each reviewer were compiled by the Project Manager to provide an overall score for each of the five RFP responses.

Decision point:
The three lowest-scoring responses were eliminated at this point as they did not sufficiently address the required criteria. All criteria were scored for the two remaining contenders. Estimated 30 hours spent per person to score the five RFP responses.

Step 9. LMS vendors are invited to conduct public demos and usability testing on campus

Each vendor of the two LMS options still under consideration was invited to deliver a 4-hour scripted demo on campus (see scripted demo schedule in Online Repository). Around 500 students and 250 faculty participated. Participants in the demo provided feedback on UC's current LMS and on the demonstrated LMS via an online survey.

Sandbox environments were established by each of the two new LMS vendors for a 2-week period of usability testing by students and faculty. Feedback was also gathered from these participants.

Decision point:
LMS Taskforce Co-chairs populated a weighted Decision Matrix for each LMS with synthesized scores from key parts of the RFP and tabulated feedback from participants in demos and usability testing. Results were used to determine which LMS, if either, to pilot. Matrix results were discussed by the whole **LMS Taskforce** and a consensus recommendation submitted to **eLearning Committee** in February 2017 to pilot one of the two LMSs in summer/fall 2017.

Decision point:
By majority vote, **eLearning Committee** accepted **LMS Taskforce**'s recommendation to pilot one LMS and submitted this recommendation to **IT Council**.

IT Council is a standing 20-person group which includes the 10 chairs and co-chairs of the 5 **Topical Committees** listed above and representatives from the student body, faculty, and faculty senate, administrative offices, IT, and the Provost's office.

Decision point:
IT Council decided by majority vote in March 2017 to provide resources to proceed with the pilot.

Step 10. Implement and evaluate a 6-month pilot with up to 100 instructors and 3,000-5,000 students

See LMS High Level Timeline for next steps in implementing and evaluating the pilot. Evaluation of the pilot will be based on data collected from participants, instructional designers, and system administrators.

Decision point:
LMS Taskforce will compile results of the pilot evaluation in a second Decision Matrix to inform a recommendation about whether to replace the current LMS with the piloted option campus-wide. Such a recommendation would proceed progressively through several decision-making bodies for approval through UC's shared governance process termed "integrated decision-making:"

eLearning Committee
IT Council
Academic governance: Faculty Senate, Deans Council, Provost's office

A final recommendation would be submitted to the **Provost** by the Director of eLearning Technology (Paul Foster) and the CIO. The **Provost** would have the final sign off on the decision.

Stakeholders involved in decision-making

Interviewees were asked who the stakeholders were in the decision they were describing. Identifying relevant stakeholders was not always simple and varied by type of decision, though the most commonly involved roles were administrators, IT personnel, and faculty. Donald Spicer, Assoc. Vice Chancellor and CIO at the University System of Maryland observed that "*understanding who needs to be involved [in EdTech decision-making] is getting murkier all the time as technologies are serving multiple purposes and lots of things are off campus. It is no longer just a matter of buying it, but also a matter of integrating it and the security that goes along with that.*" However, Spicer was adamant about the need for the CIO and IT in general to work closely with the academic administration when making decisions about technologies: "*When there's tight alignment, there is more likelihood the tools will be used.*"

Shawn Miller, Director - Center for Instructional Technology at Duke University suggested that stakeholder involvement should vary based on the type of decision being made: "*Increasingly, the decision-making and who's at the decision-making table depends on the scale, the cost and the impact of the technology. If the scale is enterprise-wide, then you're going to want faculty from some different areas. You're going to want central IT and us [Center for Instructional Technology] all together. If it's just a department, then you probably want one or two representatives from that department and maybe their dean or their department chair and an IT representative. It doesn't always have to be the same group of people for every decision.*"

At all IHEs in our sample, major EdTech decisions involved at least administrators and IT personnel. The extent to which faculty could actually influence the decision varied as previously observed, and student influence was also variable. At public and private IHEs that offer tenure, faculty have a particularly strong voice in any decisions that affect instruction. Thomas Cavanagh, Associate Vice President of Distributed Learning, described the situation at University of Central Florida when a decision was being made about an adaptive learning platform: "*The stakeholder input was really important, particularly the faculty. I think they had probably the loudest voice, if you will, in the room. As I said, we had a committee of instructional designers that had spent some time researching this and their input was really valuable. We don't make any decision here unilaterally. It always involves consultation and discussion. We try to socialize it. Even if the ultimate decision is what you would have done if you had unilaterally made that decision, which is often the case, you have to go through the process of bringing people along with you so that you have that buy-in and consensus. It may take a little longer, but ultimately it is well worth it so that you have everybody on board as opposed to something being pushed down from - quote, unquote - central IT, which is what they're always accused of.*"

Patricia James, Immediate Past Executive Director of the Online Education Initiative for the California Community Colleges, explained the rationale behind her participative approach to choosing a course management system (CMS) for the entire system of community colleges in the state: "*The people who are affected by our CMS decision are anyone at a college that chose to adopt that Course Management System. That's not just teachers. Students, teachers, and staff members and administrators, all who have to use it for a variety of things or teach people how to use it. We involved everybody, including students and the technical support staff too. We wanted to make sure that anyone who was going to be affected by that decision had a voice in it. That's why we had a committee with 60 people. People looked at us and went, 'Ah, 60?' We found ourselves saying, 'Yes. It's about the whole state. What do you want? 12 people to choose?' We couldn't do that. The committee met online every Friday via web conference from October to February.*" A participatory approach to decision-making is also preferred by Rusty Hunt, President of Lenoir Community College: "*Collaboration is the key. We can't be pushing down decisions*

from administration and expect people to implement them. It's got to be a grassroots type of thing. Obviously, we've got to oversee it, make sure it's something manageable."

At for-profit IHEs such as Jersey College of Nursing where decisions about EdTech products are usually made centrally, substantial effort is still made to obtain buy-in from school and academic leadership to assure successful adoption and implementation. However, Donny Gruendler, President of Musicians Institute, explained that while faculty input is solicited, there are reasons to make more top-down decisions: "*We do canvas faculty about EdTech ideas but it usually starts as a germ in the Office of Academic Affairs, then gets shared down with the faculty. Faculty provide their feedback, and we see if it's usable, not usable, and then we'll probably meet somewhere in the middle and change it so the faculty like it, and then move from there. One caveat is that a lot of faculty are resistant to technological changes and innovations. That's usually the reason that we're starting a little higher in the organization, with the Office of Academic Affairs, or inside ITS. It's just to get the ball rolling. Faculty input is also very much valued. The main decision-makers would have been myself, alongside the Office of Academic Affairs, and the Program Chairs. Then obviously we have a board of trustees, and we have owners.*"

Nevertheless, Gruendler was meticulous about involving academic leadership in the process of shifting the institute's entire curriculum to ebooks: "*I would also make sure to meet with each chair individually because, as you know, some people aren't going to feel comfortable giving their true opinion in a group forum. At group meetings, we would agree on how we are going forward, and does this look good? Then I'd do one-on-one follow up thereafter with each program chair to make sure this was going to fit their needs. We had weekly meetings on large topics, ad hoc meetings throughout the week on what we need to change, and one-on-one meetings to ask "Is this part working for you? If it's not, here's your time to speak freely*." Similarly Greg Karzhevsky, Chancellor of Jersey College, acknowledged the importance of academic leadership in the implementation process: "*While the campus deans may not have been involved in the decision-making, because that was done at an institutional level, having them involved in the championing and implementation of the technology was critical.*"

While most interviewees acknowledged the importance of gathering stakeholder input either to influence a decision or to help build buy-in during implementation, this input was not always helpful in setting direction. For example, the CIO of small liberal arts college described the results of gathering such input: "*We ran user satisfaction surveys on the LMS either two or three years running after we switched from Blackboard to an LMS we developed ourselves. Ironically, more or less, it was a 50/50 split. We love the thing, we hate the thing. Give us back our Blackboard, we're angry. Don't make us go back to Blackboard, that thing is terrible.*" Occasionally, an interviewee with a strong IT background would hint at frustrations with unrealistic faculty and student expectations. Melanie Kowalski, Director of Information Technology at Lackawanna College, remarked that "*Everybody wants one click.*" And another interviewee pointed out that it is hard to obtain consensus from faculty around desired levels of EdTech functionality, with some wanting all the "bells and whistles" while others preferred the basic model. This interviewee also added that, based on his interactions with students, the students judged EdTech by how faculty used it for instruction, rather than by what the underlying tools could do.

An interviewee with substantial experience leading major for-profit and non-profit IHEs observed that faculty at for-profits are more receptive to using IT to improve efficiencies: "*From my perspective, our faculty are teaching because they love teaching, it's not their primary professional endeavor or identity. Anything that we can do to improve the faculty's effectiveness and make it less time-consuming and more efficient for them, they are very supportive of, both helping us define the user requirements and testing it. I would say they are more interested in that than faculty at [a state university] because those faculty don't think about efficiency in the classroom as much. They're less interested in technology. Here,*

our faculty are much more aligned and willing to adopt and adapt to a new classroom to improve their effectiveness and reduce the amount of time they are doing clunky administrative things." (Anonymous).

Other stakeholders

Student input was actively sought in many EdTech decisions through a variety of mechanisms such as surveys, user labs, and participation in demos and pilots. However, it was rare that student input weighed equally or more than faculty or administrative input. One exception was in the re-design of a course at Colgate University, where a small group of students volunteered to work closely with a faculty member, Karen Harpp, Professor of Geology and Peace and Conflict Studies, in the re-design of *Advent of the Atomic Bomb* to create the university's first blended learning course delivered on the Open edX platform. According to Harpp: "*Everything we did in version 2.0 of the bomb class was driven by attempts to increase the interaction between the students and the alumni and it all came out of the students' ideas.*" In this particular case, the students conducted an assessment of the course redesign and published a research paper [Engaging Alumni and Students Using Online Education Technology](#) [EDUCAUSE Review, November 2015] showing that it improved student outcomes. While this does not in itself prove that involving student input in a decision leads to better outcomes, a published paper is not a bad result, particularly for undergraduate students!

In another instance, Judith Giering, Director of Learning Design and Technology at University of Virginia, engaged students intensively in testing out alternative digital portfolio options by developing a liberal arts seminar course in which the portfolios were used. Student input during the course strongly influenced her view of which portfolio option was preferable. Prof. Phillip Long, Associate Vice Provost and Chief Innovation Officer at UT Austin, described a situation in which students are taking the initiative to make their views heard: "The Vice Provost and Director of Libraries and myself have been working to support students as they craft their own white paper in support of open educational resources. The students will be heard well before the senior leaders. We're supporting the students' initiative on this topic."

In addition to administrators, IT, faculty, and students, other stakeholders were sometimes drawn into the process. At an IHE like Porter & Chester Institute that is for-profit and highly focused on preparing students for jobs, EdTech decision-making is influenced not only by IT and the equivalent of academic deans, but the admissions personnel provide input regarding what they are seeing in terms of student interest. Additionally, career services personnel "*weigh in what they're seeing from employers who are indicating to us what they expect schools to deliver to them in the employment world.*" (James A. Bologa, President and CEO, Porter and Chester Institute/ YTI Career Institute). Tina Parscal, Executive Director of Colorado Community Colleges Online, reported that including an accountant from the Business Office on a Total Cost of Ownership Subcommittee was particularly helpful in later dealings with respect to contracting and the pricing model for the EdTech product being acquired.

At Lenoir Community College, President Rusty Hunt pointed to a more unusual stakeholder group: "*We have tight collaboration with our K-12 schools, particularly our high schools. Here in North Carolina, we've got quite an integrated system for students to be able to take college classes while they're in high school. We've got high schools on campus. Those sorts of things are really successful. A lot of our programs are more intertwined than they used to be with our high schools locally. Certainly those folks have a seat at the table as far as making sure what we do is efficient and integrates with what they need.*"

The dangers of not involving stakeholders

The dangers of failing to involve stakeholders such as academic leaders and end users, including faculty and students, in EdTech decision-making were made clear by several interviewees. For example, Dennis Bonilla, Executive Dean at University of Phoenix, described the fallout from an LMS decision that did not involve the end users enough in the process:

> "*I would probably say that the impetus for us to consider moving to an external vendor-developed platform was that, as we rolled out a new version of our own proprietary platform three years ago this May, that rollout was not very successful. When I say not very successful, the platform had been created with not everybody's input and point of view. It was primarily a platform that was created by very smart people on the technology side, but not necessarily in conjunction with the colleges or with the students or with operations. Although there were a lot of very leading-edge and cool features and functions, they didn't really understand what was best for the students and faculty. It wasn't very well tested, and alpha-beta'd, and made ready and hardened before launch. When it launched, we didn't do a pilot. It wasn't done in a manner that we could mitigate the risk. The launch created quite a hiccup - we went from one platform one day to a new platform the next day, and it just didn't play out very well. At that point, we started losing students who were frustrated with the new platform, faculty who were frustrated with it.*"

Another interviewee described a similar "war story" that could have been averted with more stakeholder involvement from academic leadership early on:

> "*One story I'll tell you is that one of my early, early decisions was to stop using an adaptive math program. A couple years before I arrived, it was touted as the solution to math for undergraduate education - for non-math majors primarily. It was an adaptive program that was built for K-12, and it was supposedly adapted to work for higher ed. When I arrived, they had literally just implemented it, and were watching what was happening. Students were failing miserably. It was worsening the performance in early math courses of students doing undergraduate non-technical majors.*
>
> *It was about a hundred million dollar investment, and people were basically watching, and watching, and watching. I pulled the plug after it was in for only a couple months, because the data were showing student performance was so poor. We went back to the math product that we were using prior to that, and student performance went up. It was a painful experience with a phenomenally-touted new tool that was actually purchased and retrofitted from K-12 to higher ed using great theory, and best practices in adaptive learning. The result was it actually didn't work in practice for a number of reasons. Some were technical, some were functional, some were user acceptance, but all those came together to result in students dropping out or getting stuck in the program, and it didn't work well in an online environment.*
>
> *That's my train-wreck story. As you know, there are lots of great vendors and ideas out there working to solve problems, but actually getting it to work in practice is a much harder. The university's decision was driven very heavily by the technical team. Executives at the parent company wanted to improve outcomes, but it wasn't fully vetted, and owned, and signed off formally and officially by the academic leadership of the University.*" (Anonymous)

Sometimes the full spectrum of stakeholders is not obvious and there are surprising reactions to EdTech decisions. For example, John Kolb, Vice President for Information Services and Technology and CIO at RPI, described an unexpected response to RPI's decision to move to 1-1 laptops:

"One of the lessons I learned was that when we announced our one-to-one laptop initiative for the next incoming class, we had some pushback from the current students. I couldn't figure out why the current students were so opposed to this because it seemed to me that it was such a straightforward idea. And it took us a while to figure out that the current students were somewhat disappointed that we were putting all this energy into an incoming class of students that weren't here yet instead of paying attention to them. This was a classic 'What are you doing for me?' situation."

Who represents the stakeholders?

The manner in which stakeholder representatives were selected to participate in decision-making varied across IHEs. Some IHEs went out of their way to include less tech-savvy or less enthusiastic faculty members in demos and pilots to ensure that the product was usable across the full spectrum of faculty members, while others aimed to enlist the most enthusiastic candidates in order to quickly build momentum and spread the idea. Yet others aimed for some neutrality by asking relevant stakeholder groups like the academic senate to nominate their own representatives. Mark Berman, Associate VP and Chief Information Officer of Siena College, leaned towards involving at least some of the naysayers: *"When pulling together a group to make a decision, you have to get the squeaky wheels. In other words, if there's somebody on campus who has been complaining loudly about how things happen and whatever the particular item is, get that person involved in making the decision."* Andrew Shean, Chief Academic Learning Officer at Bridgepoint Education took the opposite view: *"…we definitely wanted people who were going to show up at meetings and not be sticks in the mud. There was a little bit of, 'Is this person effective and good to work with, are they a good team player, are they collaborators?'"*

But it was generally acknowledged that some diversity was helpful in pilots both in terms of academic disciplines represented and the applications for the technology. In some cases, a number of pilots are implemented in parallel with different user groups or with different aims. For example, Cavanagh at UCF created four "*tiger teams*" of faculty and instructional designers to pilot four LMSs concurrently.

How is stakeholder input obtained?

Typically, stakeholder input was solicited through committees, taskforces, scheduled meetings, demos, user testing, and pilots. Patricia James, Immediate Past Executive Director of the Online Education Initiative at California Community Colleges, described efforts to obtain input into a significant decision to select a system-wide Course Management System that would affect many thousands of users: *"We solicited stakeholder input in a variety of ways. We used a tool called Idea Scale, which we distributed to the entire system, asking people what they needed and then we used that feedback to create the criteria list. We were also out talking to people to ask them what they needed. 60 people served on the committee to write the RFP so they had to think about what it is they wanted. They reviewed all the responses that came in and chose three learning management systems that they wanted demonstrations for. We also visited colleges that used the three vendors that we were going to demo and talked to faculty, staff, and students there, to find out what their experience was. Then we had three days of demonstrations, and a fourth day of deliberation."*

A few interviewees described less common methods of gathering input from the users of the technology under consideration. Naveed Husain, Chief Information Officer at Teachers College, Columbia University, described a process of interviewing a variety of stakeholders to elicit design suggestions for a Classroom of the Future. Subsequently, a requirements document for the Classroom of the Future design was co-developed with 30 faculty members: *"For the Classroom of the Future design project we involved the*

general contractor, the architect, administrators, the capital people, and faculty members who were mostly identified through the President's Office. Four of us - CIO, Chief of Staff, Director of Client Services, Director of Capital Projects - interviewed everyone and then combined our input. The idea was to get as much input as possible. It's like designing a Yugo with a committee but in the end you have to synthesize all that information, put it into a Design/Requirements Document and then share it and get people to sign off on it. You are never going to please everybody but, if you get the majority of the requirements right and people feel heard and respected, I think you get some buy-in. About 30 faculty members were involved in writing the Requirements Document. I wrote up the document and shared it with them in Google docs and they actually edited it. It was kind of like a wish list."

Steve Rossiter, Director - IT Support at Delta Career Education, introduced the idea of using Salesforce software to understand and respond to user needs: "*We are big users of the Salesforce platform. If you know anything about Salesforce, you know that it's primarily considered to be software for customer relationship management, and we do use it for that. But we also have a robust project management system that we built out of Salesforce. The way a lot of this works is we'll start a project in our Salesforce software and we'll begin by collecting what we call user stories. Stories could be anything. For example, for me in IT, I need to be able to describe the tasks or the functionality that would be needed to make this project successful from an IT standpoint. They would do the same thing with the academic or financial aid folks or the campus law folks. I don't think we've ever interviewed students but, of course, they're a user story in our culture. Basically, it's collecting a lot of user stories, organizing them, and then taking those user stories and saying, 'Okay, what's the decision that needs to come out of that, how do we move forward here?' Something happens when we approve a task or a user story or some sort of functionality through that system. It's very circular and it can change as the project moves from an idea to an actual executable piece.*"

Using Net Promoter Score (NPS) to gather student and faculty feedback

A handful of interviewees mentioned the use of Net Promoter Score (see Box 13 for explanation) to gather student input on the IHE's technology. Those that use it are quite enthusiastic: "*If there's one best practice that I would have other people consider, it's using NPS to get direct feedback from students on the LMS, and on the learning experience on the LMS. It's much more than we did at [a public university] in terms of really respecting and taking seriously student input and faculty input. It really allows you to put the students front and center. All of our deans use it, and they actually have folks in charge of calling students if there's a certain trend - if they're not happy with the faculty, or they're not happy with the career relevance, or they're not happy with the LMS. How cool is that, right? To actually have folks in charge of rigorously understanding the feedback from the students, so that we can make adjustments.*" (Anonymous).

Box 13: *Using the Net Promoter System (NPS) to Elicit Student Feedback at University of Phoenix*
Interview with Ruth Veloria, Executive Dean, School of Business, University of Phoenix

What is NPS? "*A few years ago, when I joined University of Phoenix to oversee student experience, I introduced the idea of using the Net Promoter System (NPS). I had been using NPS at Charles Schwab to evaluate customer satisfaction with the company's services. The concept was originally developed by Fred Reichheld at the consulting firm Bain & Company and is a measure used in the corporate world. While not widely adopted in higher education, it was important to me to provide a quality experience for our students because you cannot attract and retain qualified students if they are not satisfied.*

The objective behind the NPS system is to get feedback on how you are doing and how to get better, and you only need to ask customers and students one thing: "On a scale of 0 to 10, what is your willingness to recommend this company/product to a family member or friend?" The customers who give you 9's and 10's are your promoters, the 0-6's are your detractors, and the Net Promoter Score is the percent that gives you a 9 or 10, minus the percent that gives you 0-6. If no-one gives you 6 or below, your score would be the maximum of 100. Apple has earned scores close to the 90's for its customer interactions in some of its retail stores. Still, 65 and above is considered very good.

Applying NPS to University of Phoenix. *When I implemented NPS at University of Phoenix, it was not immediately welcomed – there was resistance on the academic side. Our existing system collected end-of-course feedback from students, but with different questions, and instructors were skeptical that NPS would provide valid data. However, NPS was started successfully in operations, for example, the student service areas of enrollment, academic and financial services. These areas are concerned about response times and call quality, similar to the corporate call-center I managed at Charles Schwab. We gradually saw these groups embrace the NPS concept. Eventually, the NPS question was part of the student end-of-course surveys. Today, faculty complete end-of-course surveys to provide feedback on improvements to the course and the technology.*

We now have surveys going out every day to students asking them what they think about University of Phoenix. I have a constant data feed and a dashboard on my desk where, at any time, I can see what the students think about the university as a whole and their particular school and program. The data can be cut in many different ways so, for example, I can see how our campus students respond compared with the online students.

Each survey asks whether students would recommend University of Phoenix to a family member or friend. There are several follow-up questions which ask about what's happening in the classroom, interactions with the faculty member, and their opinion of our classroom technology and general support services. They can exit the survey after the first question or opt in to answer the more detailed questions. All students receive one of these surveys at the end of their first class. After the student's fourth class, the student may be given a survey at any time without the trigger of any specific event. We aim to make sure that no student receives more than two formal NPS surveys in any one year.

We also have made a pointed effort to evaluate feedback as we transition to new technology platforms. We bring students into a user experience lab and have in-depth, one-on-one discussions about their user experiences. These pilots have helped us gather the information we needed to gauge our readiness to launch to students. We use the net promoter question to ascertain whether users would recommend new educational technology platforms under development to their peers. Any time we make a big technology adjustment, it is important to reflect, in real-time, on how it impacts our students. Using the feedback from our Net Promoter Scores helps ensure that we are offering an excellent student experience.

Acting on NPS results to improve student retention. *When we get a survey back from a student that has a low score on it, our software sends an alert to those responsible for the relationship. For example, if it's on the academic side, the alert goes to a regional staff member in charge of academics that sits at one of our campus locations. Whoever gets the alert is responsible for calling the student to try to resolve the issue. Retention is higher among the students we can to talk to than among those we are not able to reach. For our students, helping them succeed academically while they manage family and professional responsibilities outside the classroom is our greatest challenge. While we design our programs with the working adult in mind, NPS is just one of the many tools we use to help our students cross the finish line.*

Who makes the final decision and how is it made?

Two-thirds of the final decisions about the EdTech product or strategy being discussed in our interviews were made by one or more administrators. Typically, a committee or IT recommendation is presented to a cabinet-level position for a stamp of approval. For example, John Kolb, Vice President for Information Services and Technology and CIO at RPI, explained that, once he made a recommendation that the university should shift from desktops to laptops, the Acting President had a series of questions before officially signing off: "*Had we done our due diligence with the faculty and others so that this thing wasn't just going to land on its own face? How did we get the vendor involved, how did we get the faculty involved? How is this going to work? How is it going to help our reputation? Is it going to interest more people in RPI or less people in RPI?*" In the case of Lackawanna College, the Director of IT and Director of Online Learning, had convened a group of IT and faculty members to choose an LMS. They presented their choice to the CIO and VP of Finance who determined that the college could not afford the chosen LMS at that point in time. At a small liberal arts college, the CIO weighed the pros and cons of each of the options considered and settled on one himself.

Lee Wetherington, Dean of Administrative Services at Lenoir at Community College, was one of the few leaders who asserted that a final decision should be made by the end users of the EdTech product or strategy: "*Where I see IT's job is to make sure the product works as advertised and that it will integrate into what we currently have. But once we make sure there are no support issues moving forward, or it's not cost prohibitive, from that point, to me, it comes down to the end user, the person that's going to use the product. They need to make that final decision on what we have identified as qualified technologies.*"

Four-year, for-profit IHEs were much more likely than others to quantify input to inform decision-making, e.g., scoring or rating each EdTech option on each criterion; weighting criteria to assign different levels of importance; using a rubric or scoring sheet to evaluate or rank the product or vendor; or creating a scoring summary, decision-matrix, or "rollup" view to facilitate final decision-making by company executives.

Adrian Sannier, Chief Academic Technology Officer at Arizona State University, expressed skepticism about what he terms the "spreadsheet approach" to decision-making: "*It very much is a multi-attribute evaluation, but it wasn't driven by, 'Oh, here's this spreadsheet with columns and this company's got an eight and a two and a three and a one, so he wins.' Technology selection is driven by the judgment of the team charged with implementing. I think that's the important thing. I participate in a lot of the decisions that are made and once you have lots and lots of people, the only way to factor in everybody's input is that spreadsheet approach. I think you can come up with fair decisions that way, but you may not come up with good ones. A for-profit company wants to be fair, but they must be effective. If your goal is to make sure everybody is heard, you can do that. If your goal is to make a thing that will really work and really be effective, you can do that. But I'm not sure you can do both.*"

In only six cases, a vote settled the outcome of the decision being discussed. Patricia James, Immediate Past Executive Director of the Online Education Initiative at California Community Colleges, described the culmination of the selection process for the system's Course Management System: "*The process of making a final decision was really about the conversation. After three days of demonstrations with the three CMS finalists, we did a full day of discussions and deliberation. I started every day of those four days of demos and final discussions with faculty on the CMS options with 'This is about students, not about you. You have to leave your biases at the door. You have to really think about what students need.*

Put that first, because that's something that we all can agree on.' If you make that the foundation for the decision-making, nobody can argue with that. What are they going to say? 'I don't want it to be good for the students'? At the end of the last day, we asked the committee members to vote. The management team did not have a vote because we did not want to push the outcome. For the vote, we asked committee members to stand up for their first choice and we counted them. Then we asked them to stand up for their second choice. We counted that. It was nearly unanimous for Canvas. Standing up is an emotional thing and very visible. It means owning and being responsible for your decision."

Box 14: *Communicating a Decision*

The CIO of Teachers College, Columbia University, Naveed Husain, was careful to provide solid justification for the college's LMS decision when communicating the outcome to the faculty. He summarized this in a short but information-packed email (see below) and provided a link to a very readable 8-page report that transparently documented how input was gathered, the results of that data collection, and the factors that influenced the decision. While there is no explanation of how the results of each set of inputs—faculty feedback, student feedback, costs, and LMS usage—were weighted in the final decision, it appears that costs and faculty preferences were given priority over student preferences.

Email about Teachers College's LMS decision reprinted with permission of Naveed Husain, Chief Information Officer, and George Schuessler, Director of Academic Technology, Teachers College, Columbia University.

Subject: LMS decision
From: George Schuessler
Date: 12/21/2016 1:43 PM

Dear Faculty,

The College has been working for well over a year to select a primary Learning Management System (LMS). We have received consistent and strong feedback from students that we need a single platform. Additionally, supporting our four different LMS platforms is unnecessarily expensive for the College. A decision was reached through discussions with faculty piloting several new platforms along with student feedback. Assessments were made including Moodle and Blackboard. There were over 90 pilot courses, and satisfaction with the Canvas platform was overwhelmingly positive with 94% of faculty surveyed saying they would select Canvas as our primary LMS. Due to this resounding feedback, we have now chosen Canvas to fill the role of primary LMS. In addition to faculty and student feedback, some of the other factors influencing our decision included:

Easy to use with a clean and aesthetically pleasing look and feel
Consistency with courses at other Columbia University schools now all using Canvas
Annual cost of about ½ that of either Moodle or Blackboard
24/7, 365 Tier 1 support through phone, chat and email for faculty and students
Good analytics functionality.

You will find a detailed report on the LMS decision at:
https://docs.google.com/document/d/1ujLoIYuPbrf2aoO9j_O3XU6nMionY49OY6ggjeMPAxA/edit?usp=sharing

Naveed Husain, CIO
Teachers College, Columbia University

Box 15: *Lessons from Down Under*

EdTech Decision making in Higher Education was designed to investigate decision-making processes at IHEs in the US. However, one Working Group B member, Fred Singer, CEO of Echo360, who interacts with IHEs throughout the world, pointed out that Australian universities have a particularly streamlined approach to selecting EdTech to support pedagogy. Accordingly, we invited Associate Professor Kris Ryan, Academic Director at Monash University, to be interviewed to see what lessons we can learn from Down Under. Monash University, based in Melbourne, Australia, serves 70,000 students, mostly on campus. Quotations interspersed below are all from Kris Ryan's interview.

Developing a technology roadmap
Less than two years ago, Kris Ryan, a faculty member in the engineering department at Monash University, was invited to move into the position of Academic Director of the university in the Office of Learning and Teaching. He was tasked with establishing an educational technology roadmap for the institution, with the proviso that "*it's not in our business model to be investing a lot of money in education technology.*"

The issues
On arrival at the Office of Learning and Teaching, Ryan immediately identified three problems.

First, he found "*a situation which I now understand is common at large universities where our instructional technology services (ITS) group was working in isolation from many of the other groups.*"

Secondly, they operated under the assumption that it was necessary "*to contact the entire faculty and get them all to agree on something before we'll agree to it ourselves. This was causing basically nothing to happen and people to get really tense with each other, because no one was able to show that they were getting anything achieved.*"

Furthermore, individual staff and faculty members were being contacted directly by vendors and ITS had "*no way of understanding who was taking on which piece of technology or why.*"

The solution
Ryan tackled the gridlock by developing a prioritized list of technology initiatives (available in Online Repository) that tied directly to the university's strategic plan with respect to research, education, and community outreach, and supported Monash's aspirations to be excellent, international, enterprising, and inclusive. Furthermore, the initiatives must offer promise of educational benefits such as supporting academics, and helping the community create, connect, and communicate. Current initiatives are:

Virtual Desktop Environment Learning Analytics
eAssessment AV Creative Facilities
Remotely Connected Learning Enhanced Live Audio Feedback
Learning Objects Economy Augmented Reality

In addition to these 8 key initiatives, faculty members and staff can propose additional ideas and initiatives using a proposal form (see form in Online Repository). The Office of Learning and Teaching publishes a Google Spreadsheet with information about the proposed initiatives so that other Monash faculty and staff can indicate their interest in participating in them. If several faculty members express interest in an initiative, it is further explored.

Once an initiative makes it onto the priority list, a series of steps are followed to decide whether to establish it as an enterprise-wide solution:

A market scan is conducted to identify vendors that can potentially serve Monash's needs

An alpha launch (pilot) is executed

An evidence base is developed on the initiative's impact on education

A business case is built regarding whether to adopt the solution enterprise-wide.

To keep the Monash community apprised of and involved with the EdTech initiatives, the Office of Learning and Teaching holds a showcase every six weeks to which faculty, students, and staff are invited. Information is shared regularly and feedback solicited through a Community of Practice consisting of education designers from across all disciplines, and with the Learning Systems Reference Group which manages Monash's enterprise-wide learning systems, education systems, and education technologies. In addition, the Office of Learning and Teaching holds regular meetings with faculty and faculty leadership to discuss the direction of the technology roadmap.

The list of technology initiatives is reviewed every six months and re-prioritized.

The thinking behind it
A key source of inspiration on what technologies to consider was the 2015 NMC Australian Horizon Report, and to a lesser extent, Gartner reports. In addition, Ryan tracks what several of the large non-research-intensive Australian universities are doing with respect to EdTech.

Ryan's preference is for "*almost invisible technology to support learning and teaching so that the focus is on the learning and teaching itself. We were very clear that we weren't going with a product, we were going with initiatives. At no time did I say, 'We need to buy X.' It was always 'We need a tool that enables us to do this.'*"

Each initiative has to be backed up with information for faculty about how the technology has been used in the past to improve student outcomes. Ryan points out that he does find research available to support the implementation of learning and teaching technologies, but such studies are generally at small scale and do not inform him as to whether the strategy will improve pedagogy across different academic disciplines campus-wide. "*Translating from a small scale to an enterprise-level scale is the challenge.*"

How alpha launches operate
Ryan uses the term "*alpha launch*" instead of "pilot" because "*In the past, faculty would ask to pilot a piece of software, actually meaning that they wanted to keep using it forever. So at Monash, the word 'pilot' kind of implies that we were absolutely going to go with this software, we just needed the pilot to figure things out. We had to come up with different terminology just so that we could say, 'No, this is different. We're not guaranteeing that we will continue to use this software. We think we're on the right track, but we're not sure and we need some people to help and give us feedback on whether this is an appropriate product.'*"

Pilots run for six weeks, which is half a semester, with the idea that, if successful, the solution can be in place campus-wide by the start of the following semester. The Office of Learning and Teaching provides training and materials for around 20 participating faculty, representing a range of academic disciplines, (out of 4,000 faculty members) and 1,500 students. At the end of six weeks, both faculty and students are surveyed for qualitative feedback on the experience. They can continue to use the technology solution for the rest of the semester if they so wish. During the second half of the semester, the Office of Learning and Teaching writes a report on the alpha launch. If the feedback is positive and mid-semester student academic results are promising, the Office of Learning and Teaching begins to prepare a business case and look into getting an enterprise-level version in place for the next semester. End-of-semester student results are incorporated in the report before deciding whether to scale up.

Gathering the evidence
Monash gathers its own evidence of an EdTech initiative's impact on pedagogy and potential for scalability during alpha launches. In addition to the feedback surveys from faculty and students at the end of the six-week alpha launch, the Office of Learning and Teaching tracks five metrics to assess whether the initiative is benefiting students academically:

Student evaluations of the unit at the end of the semester.

Student grades at the end of the semester.

Student engagement as measured by technology usage and self-reported feedback comparing their experience and level of competence in classes where they are using the technology with those where they are not.

Evaluation from faculty and head course designers as to whether the initiative allows for more authentic learning opportunities, e.g., a shift away from simple quizzes to more complex assessments.

Graduate resilience: this requires longer term tracking of how students perform in relevant courses the following year compared with students in past years who did not use the technology being assessed.

If the evidence indicates educational benefits to students, the Office of Learning and Teaching makes a business case for investing in the initiative across the entire university.

Faculty involved in the alpha launch are invited to present to other faculty members on campus about their experience, describing how they used the technology in their teaching, in what particular situations it helped, and what the results were for students. "*Having that homegrown information come from academics that people know and trust has been very beneficial*."

Does the approach work?
Ryan pointed to the success of this approach for the current campus-wide implementation of an online polling initiative. Following a successful alpha launch with online polling tools last year, he reported that "*We made the polling options available just five weeks ago across the university and it is already being used by over 9,000 students, and that was a soft launch*." Compared with the gridlock Ryan found Day 1, that's quite an improvement.

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Part IV. Criteria Used to Choose Among EdTech Options and Methods of Evaluating the Options

Decision-making criteria

Interviewees were asked to list the factors or criteria they considered in choosing among the EdTech options for the specific EdTech decision described in the interview. Most people listed between 2 and 12 criteria, with a median of 6 criteria. These fell into the five categories shown in Table 12. Criteria related to features and functionality were listed most often, in 95% of the interviews. Criteria related to feasibility of implementation and to cost/ROI considerations were listed in 82% of the interviews. User experience or usability of the technology were also mentioned in a majority of cases, 61%. Vendor characteristics such as capacity, track record, product roadmap, trustworthiness, and quality of relationship were mentioned in 41% of the interviews.

Table 12. *Categories of Decision Criteria Used to Select from Among EdTech Options*

Category of decision criteria	% of interviews in which criteria in this category were listed (n=44)	Ave. importance weight out of 100 assigned to criteria in this category (n=30)
Features and functionality	95%	83
Feasibility of implementation	82%	77
Cost/ROI considerations	82%	76
User experience/usability	61%	86
Vendor characteristics	41%	73

Notes: There were 44 interviews in which criteria for making a specific EdTech decision were elicited. In total, 277 criteria were named by interviewees and these were initially sorted into 88 categories. Subsequently, these were further aggregated into the 5 categories shown above.

Once the interviewees had listed their criteria, they were asked to weight each criterion independently for importance out of 100 (not totaling 100). While the majority of interviewees complied, some preferred to give weights totaling 100 and others preferred to rank the criteria. The average importance weight assigned to each category is also shown in Table 12 for the 30 interviews in which the weights were assigned the way we asked. User experience or usability of the technology earned the highest importance weight of the five categories, 86. Features and functionality earned the second highest average importance weight, 83. Feasibility of implementation and cost/ROI considerations earned similar importance weights, 77 and 76 respectively, and vendor characteristics were weighted slightly lower at 73. Further details on categorizing criteria and weighting them are provided in Appendix 6.

Box 16 provides an example of the criteria used in one particular EdTech decision and their associated importance weights (this is one case in which the interviewee gave weights totaling 100). Note that the weights elicited are suggestive of relative importance only rather than reflecting an absolute value – as one CIO remarked "*If you ask me this three times, you'll get three different answers.*"

Box 16: *Example of Criteria and Considerations in EdTech Acquisition*

Selection of Wireless Video Projection Infrastructure (from Joseph A. Moreau, Vice Chancellor of Technology, Foothill-De Anza Community College District)

Factor/criterion used to make decision	Importance weight	Considerations
Support for Windows, Mac, Android and iOS devices	40/100	Devices that can be used with all four major platforms (Windows, Mac, Android and iOS) were the only ones considered. Any system that did not support all four major platforms was dropped from consideration.
Compatibility with current WLAN infrastructure	20/100	The device should be a professional tool, designed for enterprise use, and must offer the same set up and security features that are required of other network devices. Consumer devices (Apple TV, ChromeCast, Roku were not considered.)
Ease of use for faculty	20/100	Our FHDA faculty group contains a broad spectrum of teaching styles, requiring a range of technologies from the most basic to the leading edge. At the center of this "bell curve" is about 80% of our faculty. This group, the mid-level technology users, was the group that we determined must find the tools "easy to use." The tool should be intuitive and should require minimal set up on the part of faculty.
Ease of use for students	10/100	We gave these criteria less weight, not because our students are less important than faculty; in fact, our students always come first. Our typical student, who resides in Silicon Valley, is a very tech savvy student, and we are confident that our students will understand and embrace these new technologies.
Features/Functionality	5/100	Once we began to compare the professional tools on the market, we found them to be remarkably similar in features and functions. The feature differences between the devices were slight.
Cost	5/100	As with features, the professional tools are very close in price, so this was not a heavy factor in the choice.

In some situations, a criterion was important in getting EdTech options onto an initial shortlist for consideration, but was not a deciding factor among the final shortlist because all options already satisfied the criterion. For example, the California Community Colleges are required by state policy to choose from among vendors who provided the three lowest bids in the Request for Proposals (RFP) process while still meeting all requirements. So, as Patricia James, Immediate Past Executive Director of the Online Education Initiative for California Community Colleges, explained about their CMS decision: "*Cost was part of it, just for a vendor to get to the demonstration. Our options were limited to the lowest three bids that filled the need. Then we didn't have to worry about cost after that - we picked what we thought best met our needs. So cost was a factor, but it wasn't the only factor.*"

For public institutions in general, regulations often constrained choice, but even at private IHEs some criteria served as "gating" factors which ruled out options before they could make it to the list of contending solutions. Several interviewees indicated that unless an EdTech option passed initial IT

vetting for compliance with externally-regulated issues such as data security, data privacy, and accessibility, they would not be considered further. Despite this apparent vigilance, several interviewees expressed continuing concerns regarding data privacy and security issues, and how much control students can and should have with respect to how their digital data are used. In Box 17, Prof. Phillip Long, Associate Vice Provost & Chief Innovation Officer at the University of Texas at Austin, expounds on these important issues. Paul Foster, Director of eLearning Technology at the University of Cincinnati, described the "6S" success model he uses to vet any proposed EdTech initiative (see visual in Online Repository) before passing it on to be considered by a broader group of stakeholders:

- Does it align with our four-year strategic plan?
- Does it fit the standard?
- Is it sustainable
- Is it supportable?
- Is it scalable?
- Is it secure?

In other situations, the constraints were imposed by the IHE's own regulations. For example, Sanjay Sarma, Vice President of Open Education at MIT, indicated that offering a fully online program for credit is against MIT rules so that when considering whether and how to create the MicroMasters program, a requirement was that some part of the program would be on campus in order for MIT credit to be awarded.

Decisions leading to substantial investments of resources often involved the issuance of RFPs, discussed in more detail later in this section, sometimes listing many criteria that each prospective vendor was required to address in detail.

Features and functionality

The most commonly mentioned factor identified by interviewees in selecting from among EdTech options is how well the product does what it purports to do. In fact, when asked whether "evidence of effectiveness" was a criterion for decision-making, interviewees mostly provided responses that equated "effectiveness" with functionality. In many cases, IHEs compiled a list of all the functional requirements for the EdTech product, whether or not as part of a formal RFP, and reviewed each option to assess whether and to what extent these requirements were met. Steven Goss, Vice Provost of Digital Learning at Teachers College, Columbia University, pointed out that because the impact of specific technology tools on student outcomes is rarely available, when decision-makers talk about effectiveness of technology, it is often "*administrative effectiveness*" such as successfully fulfilling the intended task.

In addition to the overt functionality of the product, other aspects were also considered important by some interviewees such as how well the tool complied with regulations or improved organizational processes. Prof. Phillip Long, Associate Vice Provost & Chief Innovation Officer at the University of Texas at Austin, raised the need to consider functionality of one tool in the context of what is already being used on campus to avoid excessive redundancy and unnecessary costs: "*One of the things that we were trying to do is make sure that we weren't acquiring something that is effectively being addressed already in the learning management system itself. What's happened with a lot of these [clicker] products is that they have expanded in scope. They're no longer just response tools. They are methods of doing a wide range of assessments. Learning Catalytics is a classic example. Piazza is a classic example. You can run a class with Piazza and not use an LMS at all, and some people do. You can use Learning Catalytics as your primary means for doing assessments, because they have a variety of different assessment types beyond*

just voting on a list of questions. A concern arises when add-on tools offer 60% or more of the functionality of the LMS for yet another added cost. Where does one make the trade-off in personal preference vs. redundancy in the face of rising annual expenses?"

AZ Bashet, Dean of eLearning at Eastfield College, was one of surprisingly few interviewees who judged technology options by explicitly considering student learning outcomes: "*I start with asking what are the student learning outcomes you want to achieve? I believe learning outcomes should drive what kind of activities and assessments you use. Learning objectives should be driven by pedagogical knowledge. Learning outcomes drive the pedagogy and pedagogy drives the technology.*" Interviewees who were faculty members or who taught in addition to their administrative roles were particularly likely to consider whether and how an EdTech tool or strategy could enhance teaching. For example, when Karen Harpp, Professor of Geology and Peace and Conflict Studies at Colgate University, was invited to create a massive open online course (MOOC) on the edX platform, she investigated whether and how online interactions could be used to enhance the learning activities in her course. In the end, Harpp agreed to create a small, private, online course (SPOC) rather than a MOOC, as she was not convinced that a MOOC would improve the learning experience for her students.

Other interviewees concurred with Goss' view that there is little rigorous evidence of effectiveness (with respect to improving student outcomes) for specific EdTech tools, and indicated that they are more likely to consider whether the pedagogical strategies facilitated by the tool are known to be effective. For example, Judith Giering, Director of Learning Design and Technology at University of Virginia: "*I would say that evidence of effectiveness was not a criterion in terms of deciding between the three digital portfolio tools we were considering. I think we took our evidence of effectiveness more from the research about portfolio teaching and learning, more from the pedagogical perspective.*"

Box 17: *Data Privacy Concerns*

Prof. Phillip Long, Associate Vice Provost & Chief Innovation Officer at the University of Texas at Austin, raised several concerns about the current attitude of IHEs towards data privacy:

"*If you are talking about criteria for the selection of EdTech tools, there is a whole set of criteria that should focus on what happens to the data generated by the student in the use of that tool? Where does it go? How is it curated? Who sees it? What's the data lifecycle? How is it disposed of later? Do you as an institution get it back in a timely way for analysis?*

One of the things we are dealing with is, what do we do with LTI tools? The big concern is that all of us by default grant the vendor of the LTI tool the status of being an agent of the institution and give them access to data that might have personally-identified information. None of us, as far as I know, systemically looks at whether the vendor does indeed curate, manage, and protect data that well. I think that is a lawsuit waiting to happen.

The faculty culture here, as in many institutions, is they can install whatever tool they want on their own with no permission whatsoever and use it as they wish. For years and years we've been using Piazza, for example, and they have until recently steadfastly opposed signing FERPA agreements. Worse than that, there is a little checkbox when you login to create your account which is an opt-in to allow the account creation to proceed, but it also allows all of your data to be used by Piazza and apparently sold to their partners. One of their partners is a recruiting company. So then our students who are doing well in class get contacted by the recruiter. Some people would say, 'That's terrific, you are adding value to that

student,' but the student doesn't know that's what they are signing up for. This has changed dramatically in the last two months as Piazza, at least, has stepped up and agreed to sign our FERPA clause, as I believe they are in the process of doing for others.

In the context of an IMS working group that I was a part of, we released a set of principles for the use of student data. One of them basically started off from the assertion, which I think is accurate, that students own their data. This is completely in contrast to and antagonistic with most institutional policies. Other institutions assert that they and the individual student own the data jointly. I don't buy that because ownership of data means agency with what happens to it. If a student doesn't have agency with what happens to the data, they don't own it because they can't do anything about it. Owning something that you have no control over is useless. I think the University of Texas holds a similar position in asserting that, while it is student data, we believe we have the responsibility and autonomy to use that student data to advance their best interests. We say they own it in our policy, but it's not clear what that means if you're a student. A student can't opt-out of their data going into the student information system or the LMS.

At Berkeley, they are looking at what would happen if you had a student data privacy dashboard showing all of the places that student data is used. You could actually put in a switch and say, 'This student says no to that.' What would we have to do as an institution to enable that? What would the consequences be? I think that's something that we have to start thinking about. One solution that I've talked about here, is that part of the admissions letter going to a student has a statement about, 'This is how we use your data, and you have to sign your agreement to that as a condition of accepting the offer'. I think that's being fair and transparent. I don't expect most people would say 'no', so I don't think there is much risk, but the idea that the student might be in a position to have a conditional offer based on this issue is not one that is supported currently by the institution. We have all kinds of obligations federally and otherwise to be accountable for the students' success and progress, and amongst the means by which accountability is measured is data that they generate in terms of attrition rates, in terms of the responsible use of the financial aid that they are given, that they are in fact doing the things that are required by the federal government to maintain their receipt of financial aid. That's certainly a reasonable concern many of the senior leadership have: how can we exert our responsibility and comply with legal requirements if we give students options like that? I absolutely appreciate that conundrum, and I just think that we have to confront it.

Another discussion we've had is that various things happen to the students' data like it gets put into a predictive model. That predictive model may influence the level of financial aid they get. An important discussion is whether one should at least articulate in layman's terms what the significant algorithms are that apply to the data that students generate so they have an understanding? This is an emerging focus of what is now referred to as 'algorithmic bias.'"

Feasibility of implementation

The most common concern with respect to feasibility of implementation of a new EdTech tool was its interoperability with existing systems. Mark Berman, Associate VP and Chief Information Officer at Siena College, was not atypical in his assertion that lack of integration with existing systems is a "*deal killer.*" One aspect that Berman and others specifically highlighted was the ability to offer single sign-on to users: "*One thing we're always looking at in almost any system, whether it's cloud based or local, is authentication integration - ability to integrate with our identity management system. I don't want people to have multiple passwords.*"

Michelle R. Weise, Chief Innovation Officer of the Sandbox ColLABorative at SNHU, emphasized the need to be able to extract data and integrate it usefully with data from existing technology-based systems: "*I think the other thing that is getting increasingly more powerful and meaningful to us is if they [vendors] show us how they can integrate into our legacy systems. The problem with higher ed is that we have so many legacy systems that don't integrate, and we can't extract data easily from them. So I need to know what kind of real-time information I am really able to extract from a new system and how is it fitting into our current systems? Is it through an API? Is it through something that has been vetted by IMS Global or whatever standard? If they clearly have worked with higher ed partners in the past and have done this rejiggering already, that's meaningful. We don't necessarily want to work with someone if we're their first higher ed client.*"

Scalability of the solution was also a criterion mentioned by several interviewees. In some cases, the technology can be successfully implemented at the pilot stage, but it may not be feasible to implement at an institution-wide scale. Kyle Bowen, Director ETS at Penn State, noted the inverse relationship between need for initial training or ongoing support, and scalability: "*Support is a big part of scale, so if every person who uses a technology needs a consultation, then that's something that's pretty support intensive. It won't scale very well.*"

One of our Working Group members, Phil Hill of MindWires, expressed surprise that the issue of migration from existing to new systems was not explicitly mentioned as a criterion when selecting EdTech products, although it is possible that the idea was subsumed as part of feasibility of implementation.

Cost/ROI considerations

Almost invariably, cost was a factor in decision-making but rarely the most important. Sometimes this was because all options to be considered had to fall within a budget range. On other occasions, this was because the size of the purchase was not enormous. Only in very few cases did lack of affordability preclude an eventual acquisition. Michelle R. Weise, Chief Innovation Officer of the Sandbox ColLABorative at SNHU, indicated that, within acceptable ranges, there is some flexibility with respect to costs: "*We do think about cost, but that comes towards the end of the EdTech Vetting Committee's conversation. We'll ask about pricing so that we have a sense of whether this is even possible to consider. It also occurs during the first screening call, but honestly that's not the major factor to figure out if it should go on to the EdTech Vetting Committee. Budgets I think are somewhat flexible in terms of people being able to move funds between different lines. At times, there's a little bit of room to play.*"

For other interviewees, it appeared more important that the costs of the different options were in line with expectations so as not to raise questions about value. For example, Shawn Miller, Director - Center for Instructional Technology at Duke University: "*Price is generally less important to us, unless it's completely absurd. Every once in a while that happens. People think that premier institutions can pay a lot of money for certain things, where that's not always the case. When we talked about the vendors we hardly ever brought up price, except for one of them that was much more expensive. That only was a conversation because we were wondering what we were getting for it.*"

In some instances, the consideration is more about whether the cost is worth bearing. For example, AZ Bashet, Dean of eLearning at Eastfield College, described how he might be willing to give up certain features in a lecture-capture system in order to purchase one that is 10 times less expensive than the most sophisticated. Jennifer Sparrow, Senior Director for Teaching and Learning with Technology at

Penn State, indicated that when technology products are successful, cost concerns are tempered: "*Yes, cost is important. We, like every other institution, are not sitting on fat stacks of gold like 'The Desolation of Smog.' We try to think from the beginning about what would this look like if it needed to be deployed enterprise-wide. But you don't necessarily know where things are going to bubble up and be wildly successful. Sometimes the cost consideration is overcome because it's wildly successful*."

In a few cases, cost is not initially a criterion for selection but becomes a consideration once the choices have been ranked. Tina Parscal, Executive Director of Colorado Community Colleges Online (CCCO), explained the situation for CCCO's video-capture decision: "*What's interesting is price. Something important to mention is that the RFP committee doesn't look at price when they're evaluating. That happens after we choose a product. There's a separate group that looked at total cost of ownership. So we find what we feel are the best products, and then another group looks at the pricing, because we don't want pricing to lead us.*"

User experience/usability

For most interviewees who listed user experience or usability as a criterion for choosing among EdTech options, it was given a high importance weight, but a few argued that ease of use can be addressed with training while other issues are less easy to resolve after an acquisition is made. For example, Mark Berman, CIO, Siena College: "*Ease of use would be high importance but would be balanced with other things. It would not be as important as the integration with our existing systems. It's important, but systems can be learned.*" Patricia James, Immediate Past Executive Director of the Online Education Initiative at California Community Colleges, expressed a different view, noting that it is preferable to spend limited professional development time and resources focusing on the pedagogical aspects of teaching online rather than having to start with teaching instructors and students how to use the tools. The fact that students were able to figure out a new system at most with a few brief tutorials was considered a plus.

Ron Hutchins, VP – IT at University of Virginia, suggested that students are generally less focused on the usability of the tool and more on how it is used in instruction: "*I asked the students 'What do you think about [the LMS]?' They said, 'Well, some faculty use it to good effect and some faculty don't.' It wasn't about the tool. It was about the way the faculty utilized the tool. It's about the process. It's about the education around the tool.*" Hutchins also observed a change in how faculty members assess the value of EdTech: "*But, interestingly enough, when I talked about [the LMS] with the faculty, for them it wasn't about the tool and how it was being used to teach the students. It was about how they were learning about the students. That has been a subtle shift in the last three or four years away from 'Here's how I teach the students,' to now, 'Here's how I get data about how I'm teaching the students.' That's the subtle difference. It's changing the demographics of the decision team as well.*"

Vendor characteristics

Generally, interviewees talked about vendors in terms of capability and quality of relationship. In cases where vendor capabilities were similar across all options, the quality of the relationship was more important as a differentiator, with many interviewees preferring to be considered a "partner" rather than a "client" or "customer." While some of the vendor criteria mentioned might be important to any type of customer, some are more peculiar to IHEs with their population of demanding, naturally inquisitive, and often research-oriented users. IHE users' interests in understanding the "black box" and being able to contribute to the development of a product were sometimes incompatible with the

interests of a for-profit company. Thomas Cavanagh, Associate Vice President of Distributed Learning at University of Central Florida, epitomized the demanding IHE user but suggested that IHEs have a good deal to offer in return: "*We can be a really demanding client. That's a double edged-sword. Sometimes that can be rough on a vendor because we're big and we're demanding and we break everything because of our scale, but we will also partner with them and we will be a long term advocate for them, and in almost every case the overall product has been improved, what they can offer to the marketplace from working with us. Realizeit is a good example. We met with their CEO at the time, who positioned the company as more of a research company than a vendor company. They've got people on staff that spoke the language of our research staff. That resonated with our folks and we've continued working with them to do side-by-side research and we've co-published with them, which has been really valuable. That's the kind of partnership we're looking for*."

The vendor's willingness to respond to feedback by tweaking the product was also a significant factor in some decisions. For example, Judith Giering, Director of Learning Design and Technology at University of Virginia, explained her choice of ePortfolio provider: "*One of the things that swayed us towards Digication was our belief that they were interested in our feedback to build and evolve their product. It's a company that's owned by the person who created the tool and she's very invested in that type of thing. For example, when we piloted Digication in some of our STEM courses, there's a pretty robust text editor but it wouldn't let you do formulas. We did some research and found a couple formula editors and they incorporated one of those in the tool. That happened early on and it led us to believe that they were very interested in working with us*."

Several interviewees emphasized the importance of building long term relationships with vendors to produce EdTech products that are usable and scalable. For example: "*I think the ability to have a stronger, whether it's a beta partnership or a real strategic partnership between EdTech vendors and universities where we are actively partnering in a real ownership way between us to get real results, and test these tools at scale is important. There's still too much of a divide between the tools that are being created and whether they actually work in real time.*" (Anonymous).

First impressions count

Vendors are often consulted early on in the stage of identifying potential EdTech options. Their handling of initial inquiries, willingness to invest in getting to know their potential customers, and ability to tailor their pitch accordingly, is critical. Michelle R. Weise, Chief Innovation Officer of the Sandbox ColLABorative at SNHU, relayed her perspectives on vendor interactions: "*Part of it is honestly their understanding of us. If they don't know much about us, it is really off-putting. I had one vendor as an example, where we just wanted to learn what they were doing. It looked really interesting and related to some future workforce solutions that we were thinking about. I just signed up on to their website and asked them if I could see a demo. They made it very difficult for me to get that demo and, if they had done their research, they would have realized that we're like a whale in terms of what we can offer. They asked me so many questions just to get to the demo phase, and it was getting very irritating. They kept trying to block me out of the demo process. They said, 'Well, we're really more into corporations that are Fortune 500, Fortune 50 companies. We don't know if it makes sense for us to do a demo with you because we have this certain size capacity, we're looking for enterprise-wide.' Clearly they had not looked at us, right? I said, 'We have 85,000 students,' and he said, 'Wait, what did you say?' Then it was so transparent, he was suddenly very amenable to doing a demo. It's just that kind of thing when they're not doing any due diligence on their end to figure out who we are as a potential client.*

Some of the best cues that vendors receive from us happen in the initial screening call, if they ask us what it is that we're looking for; what are our priorities for the next year? What are our pain points that we're trying to solve for? When you see them customize their demos to those questions, that, I think, is really meaningful, and helps them in terms of opening up the committee's mind to the product or solution."

Importance of roadmaps

Several interviewees stressed the importance of investigating how well the vendor's product roadmap aligned with the IHE's current and future objectives. For example, Melanie Kowalski, Director of Information Technology at Lackawanna College, described this process for the college's LMS decision: "*When we finalized our list of pros and cons about various LMSs, we contacted Jenzabar, who was and still is our current system, because we wanted to tell them what we wanted from them. They went through that list with us, telling us when they anticipated they would do something if they did have plans to do it, or if they had no intention, like they weren't even thinking about it. We wanted to see if it was worth our while to try to move or if it was something that our current vendor already had in the works.*" However, Dennis Bonilla, Executive Dean at the University of Phoenix, cautioned that things do not always pan out as planned: "*I can tell you that, a lot of times, we talk about what future product releases will be, but there's never any guarantee that the future product release will look like what anyone says it's going to look like, or will actually have all the planned features and functions when it gets released.*"

Matthew Gardenghi, Senior Manager, IT Academic Technologies at Bob Jones University, warned of the dangers of not paying attention to roadmaps up front: "*One of the things we did not evaluate very well, if at all, was the vendor's development cycle. I learned the hard way that that's important, because our LMS is years behind their competitors in critical areas. They know that, we've told that to them. They're still working on a good mobile interface for their LMS that you can use on your phone. That should have been done three years ago. The fact is, we have students or even the chair of our LMS committee, if they have to use the LMS on a cellphone on the fly, they switch to the desktop site. Really, that's a problem. We're in a mobile world, you've got to be able to do this. We missed that, but we learn. It's been a fine product and people use it. It's not the easiest to use, but it is functional.*"

In addition to attending to the product roadmap, the vendor's trajectory and stability as a company were also considered important criteria. For example, Adrian Sannier, Chief Academic Technology Officer at Arizona State University, stressed that it is important to focus on the bigger picture with vendors rather than simply evaluate the specific tool: "*It's not just about the technology, you have to be able to find partners who share your business vision.*" Donald Spicer, Assoc. Vice Chancellor and CIO at University System of Maryland, cautioned that there are downsides to working with vendors in general and start-ups in particular. Issues may arise with respect to procurement and other purchasing rules and "*Reliability is another huge issue. You don't want to be on the bleeding edge in that respect. However, at some institutions with fewer resources, partnering with start-ups may be the only way to leverage having access to the tools.*"

Vendor transparency

Thomas Cavanagh, Associate Vice President of Distributed Learning at University of Central Florida, talked at length about the importance to IHE users of understanding the mechanisms behind technology products: "*I think like a lot of others, we're not particularly impressed with a lot of marketing spiel. We really want to see the bones of what a vendor is talking about. There needs to be a there there. Adaptive learning would be a good case in point. We have some folks on staff who are pretty smart when it comes*

to Bayesian algorithms and the kinds of math that go into an adaptive system, things that I don't understand, but we want to see the math. We want to see the algorithms. We want to understand what's happening. Was this really adaptive or was this just a gussied up decision tree? As much as a vendor can be transparent, the better it is for us to trust them that they're going to be able to deliver the kinds of high expectations that we have.

Realizeit was very open about saying, 'This is how it works.' They provided us with papers, and they were willing to sit down and talk about it. When I've mentioned this to other vendors, including CEOs of adaptive learning companies, I get the, 'Well, I can't send that to you, but I'll talk to you about it.' I understand and respect that decision, but if somebody is willing to give that to us there's a better chance they're going to get our business because we can determine they have a legitimate approach.

On the other hand, we piloted a particular learning analytics early intervention product. They had a nice product but when we asked if we could get more transparency into why a student might be high, medium, or low risk, they said 'no' because that's part of their proprietary value proposition. It's the algorithm that determines that and, if they open that up, then anybody could do it, I guess. We ultimately decided that without understanding why a student might be different risk levels, the faculty would have to figure it out themselves. Given that our idea was to try and reduce that burden, especially for faculty who might be teaching large classes online, we ended up not adopting it after the pilot. I think the vendor was disappointed and frankly we were too because it was useful. Now we're in the process of trying to build something ourselves that gives us the transparency because most of the vendors we've talked to don't want to open up that black box."

Vendor intangibles

While some interviewees focused on the concrete aspects of vendor capabilities, others talked about the importance of less tangible characteristics such as trustworthiness and attitudes towards partnerships which cannot be easily captured with a checkbox in an RFP. For example, Matthew Rascoff, Vice President of Technology-based Learning and Innovation at University of North Carolina (now at Duke): "*I would say there were probably some non-product criteria, like, do I trust these people? An intangible but influential factor. There is an understanding and a relationship and sense of mutually-connected destinies. If this project succeeds it's good for both partners. The RFP bureaucracy opposes evaluating human characteristics but decision-makers legitimately care about them, so there's tension between the process and the people.*" Rascoff proceeded to describe how vendors can build trust as potential partners: "*…understand our need, empathize with the front lines, be able to explain their product in a way that would be compelling to non-technical people like end users, convey a sense of shared purpose and connected destiny. Be responsive to questions, be willing to criticize themselves - no product is perfect - and make commitments that sound reasonable and realistic.*"

For Patricia James, Immediate Past Executive Director of the Online Education Initiative at California Community Colleges, the relationship with the vendor needs to be a two-way street: "*For one of our project needs, there wasn't anything that we really liked, but we found a company that would modify what they had to meet our needs. That's a really important thing, I think, to try to get people to want to partner with you and know that they have stuff to learn and can grow from us too. For the CMS decision, we asked the 3 finalists to tell us how they could see themselves working with us. We wanted to hear them use the word 'partner.' If they didn't, if they said you're our 'client,' and they never said anything that led us to believe they could learn from us, that was a problem.*"

Methods of evaluating EdTech options

In 44 of the 45 interviews, the decision-makers described multiple strategies - up to nine but around five on average - for evaluating how well each EdTech option under consideration met their criteria. Generally, the more consequential the technology being considered, the greater the number of different methods of assessment employed. The methods were often implemented sequentially over periods of time as short as a few weeks and as long as four years before making a final decision to acquire the technology or roll it out across the institution. There was also variation in the extent to which faculty, staff, students, and other users were engaged in evaluating the options. Table 13 summarizes the frequency with which various evaluation methods were used to inform the decisions discussed in the interviews.

Table 13. *Methods Used to Assess Each EdTech Option Being Considered Against the Decision-makers'*
Criteria.

Method used to evaluate EdTech options	% of decisions informed by this evaluation method
Demo/vendor showcase	64%
IT testing/vetting	59%
Evaluating responses to RFP/RFI/RFQ/list of requirements	48%
Cost assessment (affordability)	41%
Pilot	39%
Cost-benefit analysis or ROI	32%
Obtaining input/feedback/product reviews from other IHEs/user orgs.	27%
References	20%
Sandbox	20%
Usability testing/lab	18%
Site visits to other IHEs	16%
User surveys/asking for ideas of what is needed	16%
Business analysis of vendor	14%
Reading listservs/blogs/online comments about vendor and/or product	11%
Considering impact on student engagement, completion, retention, or other outcomes	11%

Note: RFI = request for information; RFQ = Request for Quotation.

Other methods mentioned by less than 10% of the interviewees included: acquiring one or more of the EdTech options for a trial period; interviewing current users; gathering feedback on options and user needs from students and faculty through informal conversations, focus groups, or comments on a design/requirements document; reviewing data analytics; listing pros and cons of each option; testimonials and attestations from vendors; consulting employers; visiting vendor companies and requesting interviews and presentations; attending an EDUCAUSE event in which products were compared; conferring with a consultant; checking the proximity of technicians for support; and reviewing data handling procedures. In a few cases, the decision-maker was already familiar with one or more of the vendors through prior transactions and the quality of this experience heavily influenced the choice.

A variety of tools and strategies for quantifying and/or reporting preferences and evaluations were mentioned. These included rubrics or scoring sheets used to evaluate or rank the products and vendors; a scoring sheet to evaluate how well each product performed for specific use cases; a rubric to evaluate student outcomes from a pilot study; scoring, ranking, or rating individual criteria for each option being evaluated; weighting criteria; preparing a report on the options and making a recommendation; and creating a summary or "roll-up view" spreadsheet or decision matrix to present to final decision-makers for discussion. Amongst the IHEs participating in our study, four-year for-profits were the most likely to systematically quantify evaluation results to facilitate decision-making. Box 18 provides three examples of weighting and scoring of decision criteria.

Box 18: *Examples of Weighting and Scoring Criteria for EdTech Decisions*

1) Senior Administrator at a for-profit university: "*We do weight the criteria when we do an EdTech evaluation. We have a spreadsheet created by a Product Manager and we provide numeric weightings to items and there are various ways to do it. We do it different ways at different times so it might be at the category level or it might be at the item level. This gets very complex, as you can imagine with, say, a hundred criteria. When we present back our findings to senior leaders, you need a simple dashboard way to see that, so you could say from a security standpoint, it's red or it's a two out of ten or whatever. So we aggregate it into a simpler view. From a user experience standpoint, it's an eight, or it's green. We roll that up and show them one picture of how we see the product. And that includes weighting and thresholds. So if anything is red, it's probably not going to move forward.*"

2) Tina Parscal, Executive Director, Colorado Community Colleges Online: "*One of the things, particularly being a state institution, is that decisions can be contested so we have to administer those really strict rules in the sense of don't write in the RFP document, use sticky notes, because everything's discoverable. We use a scale of* superior, good, marginal*, and* unacceptable *for each criterion.* Superior*'s essentially 80 to 100,* good *is 50 to 79,* marginal *is 1 to 49, and* unacceptable *is 0. Each person who has a vote on the responses to the RFP goes through the different criteria and provides their evaluation and comments. The purchasing officer who facilitates the whole process captures all of those in a worksheet and averages the scores to tell us the overall score. The group has to come to a consensus of a single rating. The facilitator might point out that, overall, we gave one option a* superior *score and the other one* good *and does that sound right? 'Are you really sure you want to give one* good *and one* superior*? Are they both* superior*?' Kind of helping us dig down in our thinking. If there's a gap, like someone said an option is* unacceptable *but another person said it was* superior*, then we talk that through. We also give qualitative feedback to support the decision - what were the strengths, what were the limitations. We then have to down-select to determine whether or not we want to bring that vendor in.*"

3) Paul Foster, Director of eLearning Technology, University of Cincinnati (UC): "*Before we issued the LMS RFP, a 10-person sub-group of our LMS Taskforce assigned an importance weight of 1,2, or 3 to each of our 209 selection criteria in a single 2-hour meeting. We sat around the table and we came to a consensus on each one. There were some discrepancies and disagreements, but we set that two-hour time limit and adhered to it. Honestly, when you're going through 209 criteria, if you're off by a point or two on the weighting it's not that big a deal for individual criteria. I think there were maybe about 10 or so that we actually had deeper discussions about more towards the beginning. Once we got the process going, it did move pretty quickly.*

Scoring the vendor responses after we received the bids turned out to be a lot more challenging in that we were actually scoring each criterion on a scale of 1 - 5. That's where there started to be a lot of differences of opinion and differences in perspective in particular. The opinion differences, those are

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somewhat easy to navigate. The perspective differences are more difficult because what we discovered is while people really did know what criteria we needed to put in the RFP, they had a much more difficult time diving into the nuances, and the specifics of the response. The easiest example to understand is when we got into the information security criteria. Not a lot of people really understood the technical details that we got back from the vendors. We started talking about things like single sign-on, Shibboleth, SAML, whether or not these were FISMA compliant, PCI compliant, HIPAA compliant. That's where a lot of the folks, particularly the faculty members, felt that they were a little bit outside of their element.

What we did to try to address this is that several of the folks who did have that domain knowledge, we sat down and put together in a Google sheet some deeper explanation of what each of those criteria were, then how we were thinking about it, and how we would go about scoring it. It's challenging obviously because if you're not careful in the way that you write that, you end up biasing the entire committee.

So far we've spent over 20 hours working on the scoring. The first time that we went through it, we spent around nine hours that week in a room together with all 10 members going through it together. We brought in lunch and it was painfully slow. We have gotten to the point where people are doing the scoring independently now. It's still very slow. Even myself, I think I spent a little over 25-30 hours just scoring the RFP. Keep in mind we got back a lot of data. We got about 1,500 pages of responses from the vendors, really, really good information, but there's a lot there.

At the rate we are going, I estimate that each person on the scoring team will spend about 30 hours scoring the RFP. One of the things that we did do though, we initially scored just the required elements. For the top scoring vendors that moved on, we're going to score the entire RFP again. For the lower scoring vendors, where they did not do well on the required elements, we're not actually scoring their entire RFP.

The vendors were also asked to score themselves 0, 1, or 2 on each LMS feature - do you offer this feature, do you meet the requirements of this feature, or do you exceed the requirements of the feature? In practice, what we discovered is that the more sophisticated and mature companies score themselves more harshly than the newer companies in the marketplace."

Vendor demos and presentations

Once a list of potential EdTech options had been established, vendors were often invited to provide a demonstration to the decision-making group and sometimes to stakeholders beyond the immediate decision-makers. Usually, these were held on site at the IHE but sometimes an initial demo took place at a conference, via webinar, or at the vendor's offices. For a major decision in which many stakeholders were involved, vendors were often given very specific instructions or use cases to focus on for each particular audience. University of Cincinnati (UC) has recently engaged around 500 students and 250 faculty members in such "scripted demos" as part of their LMS evaluation. See [Online Repository](#) for the agenda for one of UC's scripted demos and [this link](#) for a survey that attendees were asked to complete at the end of the demo. One President described a sequence of demos and sandboxes used to facilitate the institution's choice of LMS:

"*For the final three we did a combination of deep dive sessions during which the vendor was able to present a four-hour interactive demonstration on five pre-selected use cases which we gave them. The*

use cases were around student experience, faculty experience, student services, administration, and course development.

Then we did demo day sessions, so each vendor was given an opportunity to present three one-hour demonstrations to much wider audiences. Then we had each vendor set up a demonstration site where the faculty could actually play with each LMS and try to do work in it. Mock courses and student accounts were set up in those. Then we had various work streams, so these were teams to look at comprehensive analysis and some level of testing scenarios within each of those LMS environments. The work streams were: course production; administration; integrations, architecture and infrastructure; LMS administration; and analytics. Then we did student demo days. That's the last one. In all cases the participants filled out surveys with ratings and rankings for the areas we asked them to evaluate. We had different people focus on different criteria."

Michelle R. Weise, Chief Innovation Officer of the Sandbox ColLABorative at SNHU, was clear about her expectations for a successful demo: "*We've realized that we cannot stand PowerPoint presentations. Everyone shows us wireframes and PowerPoint presentations, and they'll show us 20, 30 slides and then show us a minute and a half live on the site. Now we say that you can use one slide max, and we are really adamant about that. You need to get us into the live environment and do your demo from there. That's where we really see them fumble. That's also where we can ask the best questions. When we see it and when we can visualize it, we're prompted to imagine 'How might this integrate into the student experience that we're building?' It also shows us the maturity of the product. It's amazing how much people try to hide.*" SNHU's document "[EdTech Vetting through the Sandbox](#)" describes in detail the Sandbox ColLABorative's systematic approach to establishing SNHU's EdTech needs and to screening EdTech products before passing them on to other institutional units for further review.

Caution about demos

Not everyone was as enthusiastic about the value of demos because they are not the "*real thing.*" Donny Gruendler, President of Musicians Institute, described the problem clearly: "*We found that projects got off the rails when demos happened, because users couldn't envision that it was a demo, it wasn't the finished product. It opened up more questions, and caused more harm than good because we stopped talking about content and moving forward. We talked about what was wrong with it, even though it was a demo. 'There was a white label that could only work on one device, the screen resolution wasn't right.' You know what I mean? That was the one thing that I would caution people about. Sharing the technology options with users is great, but there's that point where you share too much, sometimes people mistake the demo or the working version as the final, in which case it's all for naught, it's all wrong.*"

Others, in addition to Weise at SNHU, expressed frustration that demos were often a lot of window-dressing: "*Sometimes, there are surprises. So with EdTech vendors, especially in this age, where so many are VC-funded, they show well in initial demos often. And then when you give the software to the IT team to evaluate, they look at it and say, 'This is poorly put together. It doesn't meet basic requirements around interoperability or security.' So because they need to get to market quickly, they build things that are really beautiful and strong on the user experience, but they don't have the foundation, the guts underneath them, to be a viable tool for us. We have many learners and we simply can't be taking chances with stability and security.*" (Senior Administrator at a for-profit university).

Evaluation by IT

IT departments within IHEs were relied on to "*look under the hood*" (Senior Administrator at a for-profit university) at the technology's architecture to establish the actual features and functionality of the product, and also to investigate whether each EdTech option being considered was secure, legally compliant, would integrate with existing systems, could use the IHE's current data sources, and could be supported from a technical standpoint. Dr. Chris Freeman described one of his tasks as VP of IT solutions at Education Corporation of America as checking how well a new technology product performed across a variety of platforms: "*I sat down with a whole bunch of different technology pieces from iPhones to Androids to Mac to PC to different tablets and just start playing with them all to see if the ebooks worked on each of them*."

Reviewing and grading RFP responses

Of the 44 cases in which a specific EdTech decision was discussed, 16 (36%) issued RFPs; one issued an RFI; one issued an RFQ; four asked vendors to respond less formally to a list of questions, criteria, or requirements; 18 (41%) did none of these; and four had not yet reached that point in the process. At least two of these RFPs are available in our Working Group's [Online Repository](). Investments of large magnitude often involved an RFP while smaller investments rarely did so.

None of the private, two-year IHEs had issued an RFP for the decision being discussed, but most of the public two-year IHEs had done so, which is not surprising given state laws requiring public institutions to issue RFPs for acquisitions of any substantial size. In the four-year sector, the for-profits were more likely than not to issue an RFP, although they were generally unwilling to share them publicly.

A number of reasons were given to explain why RFPs were not issued for some EdTech acquisitions. In five cases, the purchase did not meet a minimum threshold for RFP issuance (e.g., in one case $10,000 and, in another, $25,000). In six cases, the favored product(s) or vendor(s) were already known to the decision-makers and there was no regulatory requirement for an RFP. In two cases, the decision involved development of a course or program by personnel at the IHE rather than an external vendor. In two others, the IHE is small and privately held and does not usually issue RFPs. In one case, the IHE was not purchasing the product but, instead, making a recommendation to faculty and students and offering technical support.

One interviewee who has worked at both a state university and a for-profit university indicated that the RFPs issued for EdTech acquisitions look the same at both types of institution. However, we found they varied less predictably from IHE to IHE in terms of length and complexity. Patricia James, Immediate Past Executive Director of the Online Education Initiative at California Community Colleges, admitted that the RFP process can be excessively demanding and observed that, when the functionalities provided by all options are very similar, information on the topic is not a useful differentiator in the selection process: "*We wrote an RFP that was exhaustive, and it probably exhausted anybody who tried to answer it! It was almost too much, because we listed all the functions in there, and all the course management systems have pretty similar functions. But there was a lot of discussion in the RFP about the partnership idea and finding a company that was more than just being a vendor, but about partnership and building community*."

In some cases, vendors were asked to indicate on the RFP response to what extent they could satisfy a criterion on a 0/1 or 0-2 scale, either currently or according to their development roadmap. Some IHEs listed EdTech tools and systems already being used at the institution and requested that vendors

indicate whether their product was compatible with each one. Several interviewees noted that reviewing the RFPs and grading them was very time-consuming. Ryan R. Hobbs, Director of eLearning at Salt Lake Community College (now at Dixie State University), reported that the evaluation committee for the college's student retention system decision scored a total of 12 RFP responses using a rubric. Paul Foster, Director of eLearning Technology at University of Cincinnati, estimated that 10 people would collectively spend around 300 hours on scoring the five LMS RFP responses received by the university. That's about 1/3 FTE on scoring alone.

Cost assessments and ROI analysis

Although costs were mentioned as a criterion in the majority of interviews, the means by which costs were assessed were generally not described and the extent to which implementation costs were estimated in addition to purchase price varied. In many cases, the IHE requested a ballpark estimate of acquisition price from the vendor in advance of spending too much time investigating different options. For example, Annemarie Eades, Vice President for Information Technology Services/ CIO at University of West Georgia, reported that "*Vendors generally will give us what I'll refer to as an order of magnitude ahead of time, just so that we have an idea if we even want to proceed down the route and make sure it was within our initial budgetary constraint.*" Obtaining price estimates from anyone other than a vendor was not easy. One CIO noted that IHEs are generally required in contracts to agree not to share price information with others such that "*It's very often the case that nobody can tell you how much they paid*." Paul Foster, Director of eLearning Technology at University of Cincinnati, explained the situation: "*For the prices, we did get numbers from each of the vendors. Most of the vendors requested that that information be considered confidential and not be released. That gets a little complicated for a state institution because, generally, these records are subject to public records requests at the conclusion of the contractual process. However, vendors do have the ability to request certain information be withheld because it's a trade secret, proprietary, or confidential. Most of them have tried to exercise that option for pricing*."

In addition to the purchase price of the product, some decision-makers considered costs of implementation, ongoing support, maintenance, professional services, and add-on services. See Box 19 for an example of estimating total cost of ownership. Chris Edwards, Assistant Vice President for eLearning at University of Cincinnati, particularly emphasized the importance of considering ongoing cost considerations when a product was expected to be used at large scale: "*We have been developing a budgetary forecast model comparing the LMSs over a five year horizon where we look at transition costs, not only from a licensing perspective, but also from a course development perspective. The numbers can get quite large, quite fast at scale and if you haven't thought it through, you'll be kidding yourself.*" Matthew Gardenghi, Senior Manager of IT Academic Technologies at Bob Jones University, expressed concern about the sustainability of acquisitions that cannot be covered by the IHE's regular operating budget: "*I'm seeing a lot of educational technology being implemented without regard for long term cost. So some of these collaboration rooms... 'Well, we're going to get a grant to put this room in because it's so expensive we can't afford it ourselves.' What are you going to do in four years when you have to re-do the room? 'Well, I'm sure we'll come up with another grant.' Really? How is that a sustainable model?*"

In a few cases, state regulations affected how cost considerations were handled. For example, Ryan R. Hobbs, Director of eLearning at Salt Lake Community College (now at Dixie State University), explained that, in Utah, selection committees who are reviewing RFPs do not have access to cost information; that is only available to the purchasing department. However, the award must be made to the lowest bidder.

Selection committee decisions are made based on other criteria and sent to the purchasing office which must negotiate with bidders or return the decision to the committee.

Box 19: *Total Cost of Ownership*

Lee Wetherington, Dean of Administrative Services at Lenoir Community College, described how he assesses total cost of ownership: *"You look at the products that you want to analyze and you get the cost of that product - not only the purchase price of the product today but the total cost of ownership and what you think it will cost you to keep this product for four or five years. So, if I purchased this product today for $5,000, what does the maintenance cost on it over the next few years? Most of these EdTech items, they'll come with maintenance and then, after that, you either have to pay for maintenance if you need it, either on an a la carte basis or you can buy a contract at a cheaper rate. If it's buying a contract for five years to support this, that's a dollar figure that you can add to the total cost of ownership.*

Then you look at stuff that you anticipate will break. If we're talking about a smart board or a projector, the bulb life on that is 2,000 hours. You can do an estimate based on use for so many hours a day for so many years, of when will we have to replace that bulb. You can certainly get an estimate on what the cost of a new bulb will be and you can use that to do your calculation as well. The vendor does help with that.

Then, trying to scale this, a lot of times scaling is just a matter of if one cost is this and it's just continually 10x more than that. Sometimes if you start to scale stuff, depending on whatever the infrastructure uses, there may be some costs in networking equipment, the stuff that the data transfers on. Maybe you have to upgrade something there because it may create extra connections on your network. There's some of those things you have to take in account. All of those go into that cost factor. While it may not be an exact figure, you can at least get an estimate that you feel like you can base your decision off of."

When an acquisition was being considered to replace an existing product, differential costs between maintaining the existing system and moving to the new one were considered in a cost-benefit or ROI analysis. For example, when deciding whether to replace computer workstations campus-wide with a one-to-one laptop program, John Kolb, Vice President for Information Services and Technology and CIO at RPI, estimated the savings from no longer needing to upgrade 700 workstations every 3-4 years. He also assessed the benefits of being able to use what were previously dedicated computer labs as general purpose classrooms. Dennis Bonilla, Executive Dean at University of Phoenix, described the tradeoffs evaluated with respect to developing the university's own LMS vs. acquiring one from an outside vendor: *"We obviously looked at the sunk costs, so how much have we already invested in our platform, are we willing to walk away from that, write that off. Because that was going to be a huge financial hit in terms of our cost of development, our good will, our IP [intellectual property], our assets. Once the decision was made that we're going to move away from our own platform, it was more about what's this going to cost us moving forward, and is there enough of a delta between what we're currently spending and what we're going to spend, that we can really take some good money and invest it in other things, versus the cost of the platform. I think besides the student experience that was factor number two - can we save money, and significant money, going to this new platform, versus the current platform."*

Scott Shaw, CEO and President of Lincoln Educational Services, and Ami Bhandari, SVP of Education and Strategy at Lincoln Educational Services, compared the costs of ebooks with the textbooks they would replace. They noted that while the ticket prices appeared comparable, the ebooks came with unexpected ancillary costs, including hiring an EdTech manager to support and manage the product and

providing the infrastructure and the bandwidth to be able to support laptops and ebooks. As Shaw lamented *"All these fixed costs are getting layered in and are now just part of operating in today's world."*

Donny Gruendler, President of Musicians Institute, similarly described the considerations in shifting the entire curriculum to interactive ebooks: *"I, alongside the fiscal office, did a number of studies. You look at what you pay for in printing and packaging the material for the students. Between fees for the things we licensed from faculty, and costs of what we printed throughout the year, I think we were upwards of $1.2 million in distributing paper for each year. With this digital system, we spent a third of that. It's recoupable, and then thereafter you're making money free and clear, even if it's not that much. We had looked at it in terms of a money maker. It was more of a reduction in expenses that we could treat as income. The driving force wasn't 'We can save money,' but it just all seemed to be the perfect storm. You can save money and you can reach students in a way they want to be spoken to."*

In general, for-profit IHEs were more likely than non-profits to conduct a cost-benefit or ROI analysis rather than simply determine whether a product was affordable. Based on years of experience at both for-profit and non-profit IHEs, Randall Wells, Chief Academic Officer at Southwest Kingston University, contrasted the approaches: *"On the for profit side, it's absolutely based upon what additional new students, what new enrollment are you anticipating picking up, and what reduction in instructional cost are you expecting to demonstrate? In a for-profit model, you are responsible to the shareholders. While they may designate, 'Hey, we realize this is something we want to be a part of, we're willing to set aside, $500,000 to get this,' you can be absolutely assured they expect to see a return on that $500,000 and it better be a lot more than $500,000. You have the startup covered but you better produce some results."*

Occasionally, the gains were not considered substantial enough to merit an outlay for EdTech, even if the product was affordable. For example, a Senior Administrator at a for-profit university described the thought processes behind a major platform decision: *"At the highest level for the senior leaders making the decision, it comes back to questions of would the student or a potential student see more value in this? Would it make them more likely to want to enroll? Would it make them more likely to learn effectively? Would it make them more likely to persist in their pursuit of the degree? Would it make them more likely to recommend the experience to others? So those all come back to basic financial calculations around the learner and their success in our program. So that when you aggregate everything up and you've taken care of all the basic stuff, like is this feasible from a security standpoint, and so forth, it comes back to those basic things. Is there enough benefit here that we would pay X amount of dollars and, in this case, we said no, this doesn't benefit the student enough to justify the cost. There's other ways we can benefit the student more."*

Pilots

Pilots were generally described as small scale implementations in which one or more of the potential products were used over a test period in real teaching and learning activities, e.g., throughout a course for one semester. Box 20 and Box 21 provide examples of pilots described in detail by two of our interviewees. Sometimes, pilots were run as a way to help discriminate between the products but, in other instances, the pilot came after a choice had been made and was being used as an on-ramp to institution-wide implementation. The latter strategy appeared to be more common at for-profit entities, for example, as Steve Rossiter, Director of IT Support at Delta Career Education, explained: *"When we get to the pilot phase, we think we've got it right. We've already completed demo and internal IT testing. The pilot is to understand the unknowns that we didn't catch -- what will students and faculty tell us we*

need to address before scaling up?" At non-profits, pilots were also used as a way to ease wary users into accepting a technology solution.

One interviewee described a more contained "*simulated pilot*" (Senior Administrator at a for-profit university) in which a sandbox environment was set up for a variety of activities so that users could test it out for particular purposes rather than simply engaging in a general test drive or exploration of the product. In the simulated pilot, the users were asked to report their experience in terms of opinion of the product and their own success rate in executing the specified activities.

A big question when considering pilots is who to include – a representative sample of users to make sure it works for everyone, or willing volunteers who are likely to make it work? Thomas Cavanagh, Associate Vice President for Distributed Learning at the University of Central Florida (UCF), leaned towards the latter position: "*I have found in the past that piloting a new strategy with a coalition of the willing is effective because you get people who care about it, who want it to be successful, who are willing to take the ambiguity that goes with it. If you can get results that are positive, you can leverage those to begin to scale it.*" Similarly, Joseph A. Moreau, Vice Chancellor of Technology at Foothill-De Anza Community College District, is careful to pick visible users to participate in pilots as a strategy to build buy-in from otherwise reluctant faculty members: "*Getting everybody at our colleges to buy in is a different story. So doing a pilot with some chief stakeholders is less threatening and it really then becomes a situation where faculty say, 'Oh, wait a minute, they got that really cool thing over there. When do I get it?' And then it's more of creating demand in a user community as opposed to going to the user community and saying, 'Here's this great new thing we thought up for you. Here you go.*'"

In some cases, a number of pilots are implemented in parallel with different user groups or with different aims. Cavanagh at UCF created four "*tiger teams*" of faculty and instructional designers to pilot four LMSs concurrently, including the university's legacy system. Taking a slightly different approach, another IHE is creating one 10-15 member faculty taskforce to pilot potential LMS options with a focus on the learning analytics capability, and another faculty taskforce to focus on how the LMSs facilitate active learning. A third taskforce may be used to experiment with the LMS options in blended and online learning courses. In all cases, the faculty members will use each LMS sequentially in their courses, one LMS per semester, and produce a report comparing the options.

Several IHEs indicated that a limiting factor in the execution of pilots is the cost involved, not only paying multiple vendors for implementation and support, but sometimes providing incentives to faculty members and students, and the opportunity cost of time for all those involved. As Chris Edwards, Assistant Vice President for eLearning at University of Cincinnati, observed: "*It really boils down to considering the financial investment. There's a spike in your financial commitment because you're potentially licensing or at least have payments of some amount of money for the pilot as well as maintaining your original LMS. Then you have to think about developing documentation, training resources, support—you have to bring your service desk up to speed on all platforms. Course development becomes more complicated from the instructional design perspective. It almost is an exponential drain on resources as you add multiple platforms.*"

Box 20: *Example of a Pilot Study*

Shawn Miller, Director of the Center for Instructional Technology at Duke University, described a pilot study to evaluate the adoption of the Open edX platform:

"*For us, a pilot usually starts by gathering one or more early adopters. Depending on the technology, we recruit some faculty members who are likely to want to try to something innovative, and ask them to agree to use the technology for a limited period of time. We ask them to let us evaluate it in the beginning, middle, and ending stages, either through surveys or focus groups, sometimes also by talking to students. In addition to getting the faculty perspective, we talk to the support people who are involved in running the technology to see what their experiences were.*

For Open edX, we're piloting three different use cases that faculty wanted to pursue. One was a closed, Duke-only training course, which would be open to anyone at Duke and designed for a closed audience. One is for Duke alumni, so it's a smaller course that's only offered specifically to Duke alums. The third is a completely open course, almost like a MOOC, but offered just on this platform and run by an individual faculty member. That's what we're in the middle of running right now. We have completely closed, semi-open, and then completely open use cases. Then we're going to analyze all those use cases and see how well the technology achieved the goals for those different faculty members.

We have already previously evaluated the content and assessments in these courses so one of the main goals for the pilot is just seeing if the technology can survive the delivery, especially for the MOOC-like course. For the other two use cases, it's more about smoothness of access and the overall experience for the learners engaging in the content. We already know the edX platform works — edX.org runs thousands of courses, and we already know that MOOC-type technologies are okay for certain types of learning experiences. For this pilot, we're more interested in looking into how we get different groups from different entities in and out of this thing smoothly. Can they access things the way they want? Are we able to keep one course completely closed to just a subgroup of people, yet open another one at the same time to multiple groups, with different types of logins? Some of it almost comes down to an identity management issue, but it's really about controlling access to that content.

We'll also evaluate the cost of running this and what it would take to support it going forward. Then we'll come to a decision about what we're going to do."

Box 21: *UNC Pilot: The Merits of Piloting Two Alternative Products at Once*

Matthew Rascoff, Vice President of Technology-based Learning and Innovation, University of North Carolina (now at Duke), described a side-by-side pilot of two online tutoring solutions:

"We do our own research to evaluate EdTech products. We won't do a pilot without some level of initial evaluation. For example, we're piloting two different tutoring solutions among our campuses now. We've got six campuses that have signed up for one or the other of these tools. It's tutoring delivered online, mostly for online students. For a whole year, one or the other tool is available on these six campuses for some subset of students. They've made different choices about the audience. On some campuses it's for a larger set, on some campuses it's more targeted.

We're comparing the results of the two solutions. We've got an evaluation rubric across our pilot sites. An outside researcher is helping to design the study. It's not a randomized controlled study—it's not publishable research, but it's good enough to decide which of these two tools we should bet on as a system-wide tutoring solution. The rubric was designed by one of our campus tutoring centers, and what we've done is tried to standardize that across our campuses with a core of questions that individual campuses can supplement. It's about the results that students are seeing, the results that tutors are seeing, the usability of the tool, the impact on their classes, the convenience, the 'Would you recommend it to a friend?' question. It's basically a survey of the users that goes out to all the pilot participants, both tutors and tutees.

It was actually Bart Epstein's [CEO of Jefferson Learning Accelerator] idea to test two different products side by side. He said, 'Don't ever pilot one product in isolation. Pilot two and see which one gets the better results, because when you only have one, you're comparing that one thing against nothing. Even a weak product is often better than nothing. To get more of a perspective on comparing the product on the basis of its own efficacy, not just on the product category, it's worth having two running together in parallel.' I thought that was good advice. It also creates a little bit of a competitive dynamic among these vendors, so they work harder for you. That's good too.

The hard part's going to be aggregating this across the campuses and making a decision about which of these tools do we use, or we could do both if we want to. What I'd like to do is try out different tools, see what gets results, and then make more of a system-wide decision. It's the premise that I was talking about before about freemium. Make it easy to implement, but be rigorous about what you really invest in and what you scale up."

Cautions about pilots

Ami Bhandari, SVP of Education and Strategy at Lincoln Educational Services, warned that pilots also have their limitations. What works at one site may not at another, and the often substantial efforts poured into pilots may not be realistic at large scale: *"Our recommendation is to do at least two pilots, not one, just because you'll learn a lot more. You might have one pilot be successful, one pilot fail, so you'll have a better understanding of what the challenges are, and what's maybe related to the personalities of the people leading each of the two pilots. The other challenge is that, even if you have a pilot that's successful, it's still completely different from the actual regular implementation. Usually a*

pilot will have somebody who will champion the cause, who will be proud to be piloting. Some people put extra energy into learning and adopting something and making sure that what they're experimenting with is successful. Once you've decided to adopt it, when you go to a much larger scale roll-out and implementation, you find that the people on the receiving end can either be resistant to change, or, even if they are willing to accept the change, they want everything handed to them on a platter. They don't necessarily want to put in the same level of effort." Bhandari expressed some disappointment that improvements in student outcomes observed during ebook piloting were not sustained in the institutional rollout: *"When we looked at the analysis from the pilots, we did see improvement in grades. We did see improvement in retention and attendance, but then when you get to a larger scale roll-out, a lot of those benefits seemed to go away. I don't know if it's too early yet to say that we haven't achieved those, but I think it has to do with the level of focus in terms of the implementation and the whole psychology of championing."*

Adrian Sannier, Chief Academic Technology Officer at Arizona State University, cautioned against pilots that go nowhere, which are frustrating for both the IHE and the vendor, and suggested that it is important to consider scalability from the beginning: *"It is possible to give the illusion of innovation by doing lots of pilots that never go beyond the pilot stage. One of the ways that you make sure that you don't get caught in that, is to try very aggressively to move things to scale. We're always trying to understand how we can do implementations at scale. That said, we're not reckless. We don't roll untried things out across the entire population of students without getting some idea that we're going to be able to make those things work."*

Reviews from existing customers

For around 25% of the decisions being made, personnel at the IHE asked their peers at other IHEs to share evaluations or reviews of relevant EdTech options. For example, the staff in Academic Technologies in one four-year private university emailed their counterparts at several public and private IHEs asking if they could share their LMS reviews and written reports on why they decided to switch to a new provider or stick with their existing LMS. They also solicited advice on preparing the campus for a potential switch and obtaining student input. Rusty Hunt, President of Lenoir Community College, observed that faculty members are much more likely to listen to their peers than to vendors about the pros and cons of an EdTech product or strategy.

References from existing users of an EdTech product

While decision-makers occasionally solicited testimonials or "attestations" from vendors about the effects of their technology on teaching and learning for existing IHE customers, e.g., on student engagement, these were somewhat discounted in favor of references from the IHEs themselves. Dennis Bonilla, Executive Dean at the University of Phoenix, relied on references for reviews of vendors' customer service provision and also payed close attention to customer retention data: *"How many of the customers had abandoned the platform versus how many had stayed with it and why did they stay with it? Did they stay with it because they were afraid to change and create a hiccup, or did they stay with it because they were very satisfied?"* Matthew Gardenghi, Senior Manager of IT Academic Technologies at Bob Jones University, actively seeks out a range of views: *"We insist on the RFP that we get a list of three happy and three upset customers and we'll talk to all of them. You call the upset customer, 'Why are you upset?' Oh okay, non-issue to us, okay not a problem. Just because they're upset that doesn't mean you shouldn't buy the product."*

Sandboxes

If an EdTech option made it past the IT evaluation, the vendor was sometimes asked to create a sandbox environment in which the EdTech product was rigged to work with the IHE's existing devices or systems to allow users to test it in conditions as close to real life as possible. For example, Chris Freeman, VP of IT Solutions at Brightwood College, asked ebook providers to create digital bookshelves using some of the texts used by the college so that faculty and students could try accessing them from a variety of devices.

Usability labs and observing user tests

Some IHEs set up situations in which users were invited to try out an EdTech product in a setting which allowed close observation. Observers assessed the product's ease of use and the users' ability to execute the tasks they tried to perform: "*We could watch somebody with no knowledge of the product try to do tasks and see where they stumbled.*" (Senior Administrator at a for-profit university).

Site visits to other schools

Patricia James, Immediate Past Executive Director of the Online Education Initiative at California Community Colleges, was one of several interviewees who participated in site visits to other IHEs to investigate their experiences with EdTech products being considered: "*We went to six different schools, two for Moodle, two for Backboard, and two for Canvas, and we spent a whole day with people there, interviewing people, kept track of that information, wrote reports and brought those back to the selection committee.*"

Evaluation of vendor financials and capacity

Some IHEs evaluated the vendors for stability and long-term viability in addition to evaluating the specific product being considered. This was more likely at four-year IHEs than two-year IHEs and at for-profits than non-profits. For-profits may generally have greater capacity and incentive to evaluate other businesses given their own pressures for financial viability. One exception among two-year, public IHEs was Colorado Community Colleges Online where the Executive Director, Tina Parscal, noted that questions about the vendor's future plans as an institution have become routine in RFPs: "*One of the things that we recently added to the RFPs is more information about the vendor's future roadmap. Are they solvent? Are they publicly held? Are they privately held? Are they acquiring? Are they at risk of being acquired? Are they fully capitalized? Are they a start up? Getting a sense of their sustainability. That's one of the evaluation criteria.*"

Among the for-profits, Andrew Shean, Chief Academic Learning Officer at Bridgepoint Education, described a typical line of questioning: "*We're really interested in sustainability. We did an entire business analysis of each of the three different main vendors we looked at to determine whether or not they were likely to exist in three to four years. We looked at their cash reserves. We looked at whether they are profitable. We did all sorts of different financial modeling to determine what their current and likely future status would be. There were other factors, too, like were they on an innovative path? What kind of systems have they set up for innovation? What's their trend in consuming the market?*"

Large IHEs were also conscious of finding partners who could cope with the necessary scale and had adequate resources to be responsive on a timely basis. For IHEs that serve students mostly online, taking risks on an EdTech provider can be catastrophic. Dennis Bonilla, Executive Dean at University of Phoenix,

was among those particularly attuned to such concerns: "*We wanted a vendor with the necessary resources so that if we wanted to push on them to accelerate stuff, like, 'You guys said you could have this feature ready by May, and it's February, and we don't see it coming,' they have enough horsepower and size and money to move resources to get it done. Many other companies have a lot of customers, but they're not a big company, and they're in their early stage. They haven't been around for 10 or 15 years, and we don't know if they're going to be around for the next five. There had to be some financial stability and some customer referenceability that we could track, and say, 'We're going to check that off as low risk.'*"

Reading product-related listservs and community blogs

A few interviewees mentioned that they actively searched for discussion threads, forums, or listservs for users of a particular technology product as a way to identify any problems being encountered. AZ Bashet, Dean of eLearning at Eastfield College, observed that "*Nowadays, every vendor has a community blog where people share their experiences and you can find neutral perspectives.*" Melanie Kowalski, Director of Information Technology at Lackawanna College, noted that, while exploring options for overhauling or replacing the college's LMS: "*One of the things we saw on the listserv was people chatting about how the student information system we use was not connecting to the LMS. It was one of our big concerns. On the other hand, knowing that the vendor had already worked on integration with the system was a positive factor. As we were getting closer to a decision, we reached out to people on that listserv and discovered that those issues had been resolved. It was just a matter of the vendor figuring out what to do.*"

Anticipating possible improvements in student outcomes

While, surprisingly, interviewees did not seek out or demand rigorous scientific evidence that any of the EdTech options they were considering improved students outcomes, some talked about how they try to assess whether their choices could result in improved outcomes for students. Karen Harpp, Professor of Geology and Peace and Conflict Studies at Colgate University, thought long and hard about what her students would gain from participating in a MOOC version of her *Advent of the Atomic Bomb* course. She read the somewhat limited existing research on MOOC outcomes, consulted Colgate's IT personnel about what pedagogical strategies were practically feasible to execute on the MOOC platform, and conferred with faculty members at other IHEs who had taught MOOCs. She concluded that a small private online course that facilitated interactions between her students and alumni with different perspectives and direct recollections of World War II would be more likely to benefit learning outcomes.

Paul Foster, Director of eLearning Technology at University of Cincinnati, alluded to some consideration of student outcomes but acknowledged that more could be done to assess whether learning actually improves: "*One of the things that we do often take note of is that we know that engagement is a proxy measure for whether or not students are going to do better. Often times you don't actually gather enough baseline data at the institution to be able to determine whether students are doing better or worse after you make a change, but you do know some of the research out there that the greater engagement you have between the faculty members and the students, that that is likely to result in better improvement on the part of the student. If you look at tools and product and services, we still have to think about when we're rolling these out for faculty or rolling out to the students, is it going to increase that interaction and engagement between the student and a faculty member? Is it going to contribute to active learning? What we probably don't do as well is a determination of whether or not it has made that improvement.*"

Some interviewees considered less academically-oriented outcomes such as whether the technology product would better prepare students for their intended careers. Sanjay Sarma, Vice President of Open Education at MIT, reported that the Supply Chain Management (SCM) team at MIT surveyed participants in the existing SCM MOOCs about what outcomes were important to them and discovered that many students were looking for job advancement. In response, the MIT team turned to employers to understand what kind of alternative credentials they might value and the idea was hatched for a MicroMasters program, the first being in Supply Chain Management.

Interviewing potential vendors

Shawn Miller, Director of the Center for Instructional Technology at Duke University, emphasized the importance of investing substantial time in getting to know potential vendors up front: "*To evaluate whether the vendor would be able to meet our needs, we would explain our current environment, our ecosystem, and talk to them about our current and long term goals for what we wanted, and see if they even understand that or had previously done something similar. That's a long conversation that can take several weeks with a vendor that's new to us because they're usually coming cold to what we have in place already and what we need. They may need to go back and look into things, try out some stuff to even see if it's worth doing from their own perspective. We're also feeling out the relationship that we might have with them in the future.*"

Reviewing data analytics

For digital tools, it is usually easy to track use so that, during pilots, decision-makers were able to assess the uptake and use of the various options. For example, when testing different ebook options, Chris Freeman, VP of IT Solutions at Brightwood College, piloted the options in around 5% of the college's 200 online courses and was able to see how often the books were downloaded and used. In addition to reviewing student responses to a short, online survey about the ebooks, he also tracked how often students opted to purchase a hard copy of the book instead of, or in addition to, the ebook. He interpreted low purchase rates for the hard copies as a sign that students were generally satisfied with ebooks.

Innovative ways to evaluate EdTech products

Judith Giering, Director of Learning Design and Technology at the University of Virginia, found a unique way of thoroughly evaluating alternative digital portfolio solutions—she designed a course around their use: "*One of our instructional designers and I have developed a liberal arts seminar course on portfolios to test out the digital portfolio options. It was just one credit and we both taught it so we both had about 20 students and we were teaching them what a portfolio is, how you can use it, and having them build it. That experience was unbelievably productive and helpful because it put us right in the middle of it.*

The more we get deep into the tool, and I think this is just something that you have to spend a lot of time in a tool to figure out, we see things that we're like, 'Oh boy, we didn't think about that.' This is very technical, but in many LMSs or platforms like this, when you upload content, you upload it to a central file area and then you can deploy it wherever you need it. In Digication, initially, if I wanted to put a picture in this portfolio, I had to upload it here, and then if I want it somewhere else, I'd have to upload it again to that place. That was just not a question we thought about early on, but when students were starting to really get into it and use it, they're like, 'This is a pain, we don't like this.' Now Digication is working on amending that and building a kind of shared storage resource in the back end of their tool.

But that's just something we weren't going to know until we really got under the hood. It just didn't occur to us to ask these architectural type things upfront in our initial review."

Gathering and presenting results of assessments

A number of interviewees reported that "evaluators" (often the committee or taskforce members, but sometimes also a broader sample of intended users) were asked to rate each EdTech option against a list of decision criteria using a scale such as 0/1, 1-4, or using a rubric. An example of such a rubric from Bob Jones University is available in the Online Repository. In at least one case, the evaluators could also rank the criteria in order of perceived importance so that the overall score earned by a product for each criterion was a combination of rating and ranking of the criteria. In yet other cases, if several EdTech options were being considered, the evaluators could simply rank the product options in order of overall preference. In some situations where the criteria were extensive and very detailed, specific sections were assigned to those evaluators who were experts in the relevant field so that non-experts were not required to rate criteria about which they knew little.

Responses to such user assessments were usually aggregated by a project manager, purchasing manager, or other facilitator and the collective results presented back to the key stakeholders to stimulate a discussion around whether the aggregate results were a fair reflection of stakeholder perceptions.

Synthesizing results of multiple evaluation methods

A few interviewees described how results from multiple assessment methods were synthesized into a decision matrix, dashboard, or "roll-up" view to present to the final decision-makers. For example, Paul Foster, Director of eLearning Technology at the University of Cincinnati (UC), outlined the inputs to the decision about whether to switch to a new LMS: "*The RFP is only one element in our evaluation. Essentially along the way what we're doing is gathering information in the market place. And we are gathering information from interested vendors. We were then scoring it, getting it down to the top vendors that were attractive to UC based on their RFP. Then we have a decision matrix that we also scored and shared with Purchasing that takes into account the elements of the RFP, the public demos, the costs, then eventually we'll actually do a pilot. That pilot and the data that we gather from the pilot will inform the recommendation to various governance groups as to whether or not we make the transition*."

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Part V. The Role of Research in EdTech Decision-making

What counts as research to EdTech decision-makers?

All interviewees stated that they conduct research when making EdTech decisions, but their definitions of "research" varied widely. Several referred back to their answers to earlier interview questions about sources of EdTech information and trends, and methods for evaluating EdTech options, as examples of research they conduct. Overall, definitions of research included the collection of various forms of information, externally or internally, at each stage throughout the decision-making process to identify needs, to find potential solution options, to evaluate those options before choosing one to implement or scale up, and to evaluate the implementation after the decision had been made. Activities that counted as research and the frequency with which each was mentioned are summarized in Table 14.

Referring back to the types of information that typically count as evidence in education decision-making (Box 1), most of the sources of evidence that interviewees reported relying on could be considered data or local knowledge, with very few instances of scientifically-based research. EdTech decision-makers we interviewed appear to be almost as likely to rely on written materials and studies sponsored by vendors as on similar materials written by industry organizations and consortia. Less than a fifth rely on scholarly papers or journals and even fewer conduct comparison studies to evaluate the impact of EdTech products on student outcomes.

Table 14. *What Counts as Research to EdTech Decision-makers*

Activities that counted as research	Frequency with which this activity was mentioned (n=45)
Conducting student, staff, and faculty interviews, surveys, or focus groups	40%
Looking at student outcomes after implementing a strategy or product	38%
Reading industry, consortium, or trade publications, reports, or white papers	33%
Participating in site visits/asking peers or references what products they use and for feedback on products	31%
Reading vendor-provided information/literature/materials/white papers/case studies/efficacy studies	31%
Reviewing data analytics based on own platform or tool use data	24%
Reading forum, blog, or internet reviews about tool; gathering info. via social media; internet searches	24%
Conducting a pilot	22%
Reading articles/reports/literature reviews/annotated bibliography/research materials on product (sources unspecified)	20%
Reading scholarly papers or journals	18%
Conducting investigations at own research centers or institutional research units	16%
Conducting comparison studies	16%
Conferring with consultants	13%

Additional activities cited as examples of research but mentioned by less than 10% of interviewees included conducting case studies; estimating cost savings or revenues, cost-effectiveness, or ROI of a technology product or strategy; and randomized controlled trials.

One President illustrated a range of definitions for research within his own institution: "*We define research broadly. There's research where you're scouring the landscape for solutions that you don't believe you can build or discover yourself. We do a lot of that because we're a big believer that we don't have all the answers, but somebody else might. Then there's a second set of research we do. We run a lot of pilots to see if we can move the numbers or achieve the student outcomes we want on a small scale. A lot of our pilots lead to bigger pilots to see if it scales up. We consider pilots a big part of our research agenda. Then we do have certain areas where our internal R&D groups will write up papers on certain broad research topics. They have written papers on the state of adaptive learning, social learning, and digital badging. Then our Center for Simulation has done research papers on the medical and nursing simulation platforms, the mannequin based ones, and effective use of them. That's mostly research on how well the platforms are working in our environments.*"

Karen Harpp, Professor of Geology and Peace and Conflict Studies at Colgate University, distinguished between doing research as a contributor to her field of expertise and doing research to implement a pedagogical practice: "*I would define research in two different ways. One related to our online education and EdTech use, and one related to my field of scholarship expertise in geology and volcanology. I would define research for us in the EdTech field as everything from consulting with experts in the field, to digging through the academic literature and pulling out as many articles that seem immediately relevant, reading them, discussing them, and then collating those responses to help us make a decision about what to do next. It's research to help us do something. Whereas, if I had to define the research that I do as a scholar in geology, that's doing the same thing I just described, but also it's going out and collecting new data in some form. EdTech isn't what I consider my field, whereas if I write a paper on eruptive behavior of volcanoes in South America, that's where I'm more familiar to put out new information.*" Harpp also pointed out that whether or not she will take the time to conduct research on an EdTech strategy depends on timelines and the effort required to implement the strategy: "*It depends entirely on two factors. One is how much time I have before I need to implement the EdTech. If I have time, then I will. When there isn't time, no. I just try it because I think it sounds like a good idea. The second thing is related to how difficult the implementation is going to be. So if it's an easy trial, and doesn't take a lot of prep time to give it a whirl in terms of the logistics, then I'm much more willing to dive in and try it without having done enough homework to justify it, whereas if it's big and complicated like developing a SPOC [Small Private Online Course], I'll do a lot of homework.*"

A few interviewees defined research more rigorously than most. For example, Judith Giering, Director of Learning Design and Technology at the University of Virginia, suggested the bar for what constitutes research should be set at studies that require Institutional Review Board (IRB) approval—which in itself is only is only required for research that is considered "generalizable" across contexts and is intended for public consumption: "*Well, I guess for me research is something that has gone through an IRB and has a methodology that I can read about and that kinda says, 'These are the outcomes and these are the conclusions of our outcomes.' When I hear 'research,' I don't think things like, 'Well, we did a survey of faculty and students using this tool and here's what we came up with.' To me that's not research. It's interesting and useful - but not research.*" According to Giering's definition, local evaluations such as pilot studies, which are used to inform an IHE's program implementation and improvement cycles, would not count as research. But, if these were to be shared publicly, IRB approval might be needed.

Several interviewees acknowledged that their EdTech-related research efforts did not aspire to the rigor of scientific research. However, they argued that executing this type of work usually takes too long to be helpful in making decisions in a fast-changing field. With a few exceptions, the research described was not "generalizable research" to be shared with other IHEs or the public. For example, results of pilot studies are rarely shared outside of an IHE except upon direct request by another IHE. As a result, many IHEs are running pilots on the same products simultaneously without collaborating or comparing results. Michelle R. Weise, Chief Innovation Officer of the Sandbox ColLABorative at SNHU, expressed her frustration with the status quo: "*Part of the impetus for our sharing information more freely through our new website was because we are tired of universities sort of holding their cards close to the chest. It does us no good if we have no idea what happened in X university's pilot with Knewton, or Y's pilot with Learning Objects, etc.*"

What research is done when?

The different types of research activity were used at different points in the decision-making process:

- ➢ General background information-gathering throughout the year on technology trends, technology solutions to current IHE needs, and the variety and capabilities of products.
- ➢ More purposive, targeted searches for pedagogical strategies and practical solutions to address particular needs identified by students or faculty, e.g., search for strategies to improve retention.
- ➢ Once a potential strategy is identified, search for specific means of operationalizing it, e.g., predictive analytics or student retention software compatible with IHE's existing student data systems.
- ➢ Investigate potential product options through demos and pilots, primarily to determine ease of use and feasibility of implementation, but also in some cases assessing impact on student outcomes.
- ➢ Post-implementation investigations of products and strategies being used at the IHE to assess impact on student outcomes.

Ami Bhandari, SVP of Education and Strategy at Lincoln Educational Services, referred to routine use of surveys to identify technology needs as one type of ongoing research to inform her EdTech decision-making: "*We do student and instructor surveys every six months to assess the quality of EdTech implementation. Our surveys look at three different areas: equipment and connectivity; the learning management system and the actual content and what parts of it they appreciate and find useful; then third is the classroom experience itself. How many hours a day are they spending using this particular EdTech? How do they prefer the online content versus the textbook reading or lecture or lab activities, and do they find it helpful to their learning?*"

At the outset of a decision-making process, some IHEs assigned someone the task of developing a literature review or annotated bibliography on the relevant EdTech topic. For example, Ryan R. Hobbs, Director of eLearning at Salt Lake Community College (SLCC) (now at Dixie State University), reported that the selection committee for SLCC's student retention system began its process by investigating the research literature and the college's own data on leading indicators of student success or failure. Based on this preliminary research, the committee compiled a set of desirable features for a student retention system such as a focus on timeliness and scores on early assignments.

Some interviewees, especially those with an instructional design background, focused more on research about the pedagogical strategies than on the technology tools per se when searching for EdTech

solutions to identified needs. Steven Goss, Vice Provost of Digital Learning at Teachers College, Columbia University, exemplified this approach: "*It's a tough question because I don't really think 'tool' first. So for me, it's more about 'Is this practice effective?' In my mind, the tool is secondary. I don't look at it as 'Did a software tool improve students' understanding?' It's usually how the teacher utilizes the tool that I prefer to see assessed.*" Judith Giering, Director of Learning Design and Technology at University of Virginia, echoed a similar view: "*We don't necessarily look for research—and I mean real research—on a specific tool. Frankly, I'm not really aware of a lot of research on tool X that's been done with a real methodology... But we do turn to the research to really help build a rationale for things like active learning or digital portfolios. A lot of times we have to connect dots between what we know about pedagogy and what the tools can do, for example, what we know about active learning and whether specific tools enable us to do active learning better.*"

Several interviewees described efforts to use research-based instructional design strategies. Shawn Miller, Director of the Center for Instructional Technology at Duke University, noted that research on learner attention to videos in MOOCs by MIT and others has helped to reinforce advice his center has always given faculty about the optimal length of instructional videos. Now that rigorous research exists, faculty members are more likely to pay attention: "*Even if the faculty don't read it, it doesn't matter because they believe it. They'll argue less about it, so now we've overcome one hurdle in the instructional design process.*" Chris Edwards, Assistant Vice President for eLearning at University of Cincinnati (UC), reported that for the past 3-4 years, UC has made a concerted effort to ensure that EdTech professional development addresses evidence-based pedagogy as well as demonstrating technology solutions.

For-profit IHEs appear to be more systematic than non-profits about tracking student outcomes data, both from pilots and also for regular instruction. This may be partly to satisfy regulatory requirements and partly for "business intelligence" to better understand their student customers and the services needed to attract and retain them. Indeed, several interviewees mentioned a dedicated business intelligence office. Dennis Bonilla, Executive Dean at the University of Phoenix, described the institution's significant investment of effort in predictive analytics: "*We have a huge internal organization that focuses on data analysis, and trying to understand better how our students behave, and predicting 'Are they going to do well if they haven't posted an assignment by Tuesday? Is that an early indicator warning flag based on all the data we've collected that says it's time for that academic counselor to reach out to them?' Because if they haven't posted by Tuesday, typically what we see is that they don't post at all. There's a lot of internal data and research that we do on our own around our students and how our students behave, in addition to collaborating with other big institutions like Stanford and the University of Michigan, the Bill and Melinda Gates Foundation, organizations that have big data warehouses and a lot of information that can be shared.*"

In a few cases, the interviewee indicated that he/she did not make decisions based on research but relied on others participating in the decision-making process to do so. For example, one CIO reported that he deferred to the college's Teaching and Learning Center and Director of Academic Technologies for input on the pedagogical value of a specific EdTech strategy or product. The CIO viewed IT's role as providing "*the right set of resources to the Teaching and Learning Center where there are specialists in the pedagogical domain.*"

In other cases, the technology solution being considered was not directly aiming to improve student outcomes and was considered a "utility tool," which affected the kinds of information useful for the decision-making process. Tina Parscal, Executive Director of Colorado Community Colleges Online (CCCO), noted that, while she generally gives greater precedence to peer-reviewed research over other forms of research, research on the pedagogical value of EdTech may be more or less applicable

depending on the kind of technology being considered. For CCCO's selection of technology for video-capture, streaming, captioning, and storage, such research did not appear particularly applicable: *"This was almost transactional. There was conversation around research related to accessibility. Also, someone brought up some data about bandwidth considerations like size of files and down-transfer rates. There weren't a lot of pedagogical conversations. Now, for the LMS decision, there's a lot more of that happening. In this one, it was pretty tool-centric, because it's more of a utility tool."*

Lack of relevant EdTech research

Many interviewees lamented the limited availability of rigorous and timely research on EdTech strategies and tools. A Senior Administrator at a for-profit university remarked that *"Any external input would be useful. With most EdTech, there is just really nothing."* Furthermore, even if such research existed, some interviewees suggested that its applicability to their own context was likely to be low because of differences in size and demographics of student and faculty populations, and in other local factors that might affect implementation. Chris Edwards, Assistant Vice President for eLearning at University of Cincinnati, and others noted that studies at IHEs are often conducted in a highly localized context with a small sample size: *"For me, one of the things that I find difficult and frustrating with EdTech research is there are very few multi-site longitudinal studies. Almost everything is very small with something like a dozen to maybe 100 or 200 participants, at single institutions with a technology that may not even be current. By the time it gets published, two or three years have passed. By the time you get the research, well, that's an eternity in EdTech. So you're almost reading tea-leaves and extrapolating from the past looking forward. It's very difficult to have current research about the efficacy of current tools in the marketplace. It almost doesn't exist."*

Matthew Rascoff, Vice President of Technology-based Learning and Innovation at University of North Carolina (now at Duke), was only marginally more optimistic when asked whether he used research in his EdTech decision-making processes: *"Absolutely—when it's available— but it's rarely available. I think that's a huge problem for our sector. I oversee online learning strategy for the UNC system. I'm very interested in technology that supports online learning, adaptive learning, personalized learning. To the best of my knowledge, there's one [randomized control trial](#) of all of those areas. It was done by Ithaka S+R in 2011 at the University of Maryland with M.J. [Bishop], and there has been nothing, no gold standard research with random assignment since then of technology that's evolved a lot in the past five years. It was on the Open Learning Initiative statistics course. Sure, it's hard to do— but not impossible, as they proved. It's more a matter of will and organization and money."*

Ami Bhandari, SVP of Education and Strategy at Lincoln Educational Services, noted that for IHEs that are at the leading edge of innovation, it is hard to find relevant research for EdTech strategies being considered: *"We use research when it's available. However, what we've found with everything that we've done is that we've really been early adopters. Sometimes, the vendor will have information on the success of other clients, but just because of our sheer size we're often sought out to be a pilot school initially."*

Other entrepreneurial IHEs ran up against the same problem, such that, when implementing new strategies, beyond gathering data to inform the decision, it could often come down to a judgment call. Sanjay Sarma, Vice President for Open Education at MIT, described this situation in reference to MIT's decision to launch the MicroMasters program: *"I think there are two or three different types of decision-making. There's highly analytical decision-making where you don't move until you have proof that it's going to work. But then there's more entrepreneurial decision-making where there is no proof it's going to work because it doesn't exist, right? Balancing those two extremes is not trivial. The reason I had to*

make a decision in the end was that it's hard to make those decisions by committee. You've got to go with a judgment call. It's a shot in the dark, but not totally in the dark. You illuminate it as much as possible with data. We had a lot of online courses already and we knew from survey data that advancement in the job was an important criterion. We had some evidence that companies would value this because we spoke to many companies."

Jonathan Becker, Director of Learning Innovation and Online Academic Programs at Virginia Commonwealth University, identified a gap in the existing EdTech research base that researchers need to fill: "*I was just this morning reading a blog post the title of which is, 'Is EdTech Research Nearing Its Big Tobacco Moment?' The gist of the article is that there seems to be two strands of research in EdTech. One is the vendor-subsidized stuff which raises all kinds of questions, and then there's the research that's being done mostly by psychologists and others who seem to have an agenda to scare people away from technology. There's nothing in between. It's become this polar, 'EdTech is great. Use our product,' versus, 'EdTech is destroying society as we know it.' There's a chasm in between or lack of independent research.*"

Cautions on (some) vendor-sponsored research

Almost a third of interviewees referred to vendor-provided information, literature, materials, white papers, case studies, or efficacy studies as types of research that influence their EdTech decision-making. But, speaking from his own past experiences in conducting vendor-sponsored research, Jonathan Becker, Director of Learning Innovation and Online Academic Programs at Virginia Commonwealth University, provided reasons to look twice before accepting the conclusions of such studies: "*I'm a little scarred maybe is the right word. I worked for many years doing EdTech evaluation research funded by the vendors. It put a little bit of a bad taste in my mouth about how that process works. I tend to look at vendor-funded studies of their own products with a pretty skeptical eye. One big issue is their degree of involvement. It certainly varied from vendor to vendor, the degree to which they were involved in a particular study, the degree to which we would set up research conditions that I think were not typical of day-to-day schooling; we created a bit of a lab that wasn't realistic in some cases. In some cases, the vendors are pretty distant and trusting that you'll do the right thing, but frankly there were times when we wrote a report that aimed more at pleasing the vendor/client than what was probably a more honest way of reporting it.*

The example that stands out for me is one that I wasn't involved in, but I then wrote a series of five blog posts about it, and this was a number of years ago. One of the big consultants put out a study about Promethean interactive whiteboards, and, based, on his study he concluded that interactive whiteboards improved student achievement by 17%. It was a really hideous piece of research, and so I critiqued it in a five-part series looking at the methods, looking at the context of it. It was pretty awful, but for me it was pretty standard fare because Promethean paid him to do the research. It reeked of all kinds of strange doings between the two. If interactive whiteboards truly improved student achievement by 17% then I think everyone would be knocking down the doors to make sure every room had one."

What is efficacy research?

The term "efficacy research" did not mean anything to one third of our interviewees. Definitions among those for whom the term was familiar varied widely with 68% including the impact of a product or strategy on student outcomes, while others focused more on use as intended or meeting goals related to functionality or efficiency. Several of the definitions we collected are shown in Box 22. Prof. Phillip

Long, Associate Vice Provost & Chief Innovation Officer at the University of Texas at Austin, elaborated on why both the term itself and the concept behind it are unsatisfying: "*I've always struggled with that word. One dimension of efficacy is efficiency, and then efficiency can be applied to cost, it can be applied to the match between the tool's function and the pedagogical need. Efficacy also has an implication that somehow the method by which the tool delivers that functionality is better in some sense than other choices. That's why I don't like the word because, while I get it conceptually, I can't then turn around and say, 'How do I operationalize this?' I don't truly know how to operationalize it in this context. The reason is that value propositions are contextual. What matters to a land-grant public research institution relative to a small private, relative to a community college, I think can be radically different. You would get a different definition of what is efficacious in each of those contexts. So how useful is that term? I have no trouble with individually calling something efficacious or not but, deciding that a particular educational technology purchase for an institution is a purchase that embodies efficacy, I don't know about that because, in my experience, that's a rare occurrence - if ever.*"

Limitations of efficacy research

Ron Hutchins, VP – IT at University of Virginia, expressed similar skepticism about the value of efficacy research: "*I think research can tell you about a specific situation which includes facts about the professor, facts about the students, facts about the environment, facts about what day of the week it is. I'm being a bit extreme - I think efficacy research is important but there are so many subjective factors in the learning environment that I struggle with making that the most important quality for making a decision.*" Ryan R. Hobbs, Director of eLearning at Salt Lake Community College (now at Dixie State University), also identified limitations of trying to assess the impact of an EdTech solution on student outcomes: "*It's hard to say that a particular solution or system has really made the difference. It's hard to isolate that just because there are so many variables involved.*" On a more practical note, Hobbs pointed to the difficulty in accessing the specific student data needed to conduct meaningful evaluations: "*It is time consuming, can be expensive, but it's also just something that's not readily available.*"

Only one interviewee, a President, alluded to the definition of efficacy research as presented by the National Science Foundation and U.S. Department of Education's Institute for Education Sciences—and then he went on to explain why he does not find such research helpful: "*It is the buzzword of the day. That would be doing some kind of studies over some time horizon with a control group where they were trying to test the efficacy of a given process or change that they were inputting into the non-control group to see if it had the intended results. We talk about it only a little bit, mainly because we haven't seen a lot that's been practical enough for us to do anything with. I don't care about whether something works in perfect conditions, which is part of the official definition of efficacy. It would be more applicable if it was under real world conditions, in our case, with real students.*"

In line with interviewee reactions reported earlier to research in general, several interviewees expressed reservations about any kind of efficacy research conducted outside of their institutions. Continuing a recurrent theme, they argued that positive results observed in one context do not often translate to others. Matthew Gardenghi, Senior Manager of IT Academic Technologies at Bob Jones University, was particularly clear on this point: "*We have a very interesting culture here because we are a conservative, small, Christian university, and that creates a dynamic. Students are required to go to class or they are dropped from the class. If we say 'Everybody's got to try to use this technology in this class,' they do it. In other schools, taking such a hard line approach may not work. Our student body is not wealthy - lower middle class is what we're drawing from. I taught a freshman orientation class in 2014, and I asked the*

students how many have a cellphone, and not everyone raised their hand. I said, 'Okay, of those who have cellphones, how many have smartphones?' Only something like half of them had a smartphone. Some of this stuff that's used as innovation at other schools doesn't necessarily translate as useful anywhere else because the demographics are so different." Gardenghi also expressed concerns about the lack of depth to existing research and need for a focus on actual student learning outcomes as opposed to simply documenting, for example, that students are more engaged in their work.

Box 22: *Five Definitions of Efficacy Research from Interviewees*

Ami Bhandari, SVP of Education and Strategy, Lincoln Educational Services: "*We continuously try to measure the efficacy of our implementation. We look at a variety of metrics. We look at GPA before and after implementation, number of failures, attendance rate, retention, the number of students that have dropped after taking a class before the implementation vs. after the implementation. Those are some of the metrics that we use to measure efficacy, but whether the technology is effective or not can be due to reasons other than just the technology itself*."

Judith Giering, Director, Learning Design and Technology, University of Virginia: "*To me, efficacy research, if it's around a tool or a pedagogy, means to what extent can we show that it's impacting learning?*"

Dr. Preston Davis, Director of Instructional Services, Northern Virginia Community College: "*Efficacy sets the value of the tool: does it deliver what it is supposed to deliver, are those outcomes sustainable over time and impactful across a broad demographic of students? It's really a combination of how effective something is and how applicable it is for what our goals are for delivering instruction*."

Sanjay Sarma, Vice President, Open Education, MIT: "*Efficacy research is identifying what you want to achieve and seeing how much you achieve that.*"

Shawn Miller, Director - Center for Instructional Technology, Duke University: "*There's two ways to address that question, right? There's 'Is it broken or does it cause technical problems?', and then there's 'Does it achieve some sort of measured learning outcome?' Those are two whole separate issues. Sakai runs well here, and no one really has any complaints about it, but do I think it makes a measured difference in test scores, for example? Probably not.*"

Do IHEs conduct their own investigations of how well EdTech products work?

In thirty-five interviews (78%), participants indicated that their IHE conducts its own investigations or research into how well EdTech products currently being used work. These studies varied widely in goals and methodological rigor with a few resulting in peer-reviewed publications but most not being shared publicly. Several of these are summarized as examples later in this section. Results of these investigations were often used for continuous improvement of instruction or for deciding whether to continue or scale up use of the EdTech product or strategy. For those IHEs who did not undertake such investigations, the reasons were related to costs, time, capacity or "bandwidth." As one President of an IHE lamented: "*We would always like to do more. You know, money and time. Nobody seems to be making any more of that*."

Andrew Shean, Chief Academic Learning Officer at Bridgepoint Education, described several levels of research conducted at Bridgepoint, some of which could certainly pass muster as scientifically-based research:

"So here are the main things that I would say we do on a normal basis. The most simple is a pre-test, post-test. The second is we actually have a data system set up where we get fed data on a somewhat consistent basis and we have specific metrics that we look at. Those are end-of -course surveys, student learning outcomes, course completion, course fail, course grade, persistence, and then, ultimately, retention. So anything that we do, you'll be able to look at through the lens of those metrics that get reported on, let's call it monthly.

The next step up is we'll do an actual control/non-control group study with various caveats to it. We might do stratified random sampling. We may just do a random sample. We may intentionally try to set up the study so that we get as many of the variables controlled as possible. Ultimately, a control/non-control group.

The next tier up would really be more qualitative in nature like student focus groups. A sentiment analysis is one that we recently did. What we did is in the discussion forum of one of our high enrollment courses, we tried to look at the kinds of student tones that were being expressed in the forums. Was it positive? Was it negative? Was it career aspirational? Was it focused on the content specifics? Then we also looked at mapping whether or not there was actual discussion taking place and was it just student-to-student? Was it student-to-instructor? Could you sort of scatter plot that out and visually see what was actually happening in there? So that's much more qualitative by nature. Those are the kind of things that we would do."

For those in positions of acquiring and supporting technology, useful investigations may be more about figuring out what technology is and is not being used and what needs to be supported. Shawn Miller, Director of the Center for Instructional Technology at Duke University, illustrated both the practical needs for ongoing data analysis and the aspirational goals for data analytics:

"We definitely do our own research into how things are being used here, but I don't know if you'd call it rigorous, scholarly research as much as a data analysis. For example, we just upgraded Sakai to Sakai 11, so we've spent the semester going back and looking at usage stats, also running some small user surveys, some other data points so we can decide if it's still meeting people's needs.

We also do periodic reviews of the data and the usage stats for add-on technologies to Sakai. Basically we're trying to decide whether they're still worth running and whether people are still using them. If there are strong upticks in some of those things, then we may decide to put more resources towards helping people use those things.

We do an annual report every year. You can go to https://cit.duke.edu/2015/, and that's our most recent annual report. Duke doesn't really have any strategy in place yet for using all of those analytics to inform teaching and learning decisions, but we're hoping that that becomes the case at some point. We keep sharing a lot of it to remind people that we're collecting all this information. Wouldn't it be nice if we all got together and used it?"

A few IHEs, both non-profit and for-profit, operate their own R&D centers that focus on EdTech solutions to institutional challenges. In Box 23, one President describes the work of three different EdTech-related R&D centers at his institution. In Box 24, Adrian Sannier, Chief Academic Technology Officer at Arizona State University, describes the Action Lab's work to continuously tinker with and improve entry level courses in a concerted effort to help students succeed in advancing beyond them. Sannier observes that, to conduct meaningful research, scale is necessary in order to produce enough data to analyze. In both examples, there is less focus on sharing results externally, and more on generating research to inform internal practice.

"We have a couple of internal R&D groups. One that specifically looks for innovative external EdTech companies that we can work with, whether it be startups or established companies. That's an area where they do active research on that group and then they bring that to the institutions where the technology seems like it would be applicable and would address a strategic concern. As an example, if one of our institutions was concerned about persistence at the undergrad level and they were looking for solutions that would help with their unique set of needs, then our R&D group would go look for them. Whereas another school may believe their next strategic thing is to provide more individualized learning—maybe they are looking for adaptive learning components.

Then we have another R&D group at the organization that specifically does healthcare R&D around simulation. That includes the mannequin simulators that you see in nursing, medical, and dental school all the way up to virtual simulation, whether it be software models on a tablet, or fully interactive online models, or high-end touch kind of tablet, or 3D virtual reality.

Then lastly, we have a group that works on test prep solutions. They do R&D specifically around how to best prepare students for high stakes exams like the USMLE, NCLEX, the CPA, the CFA over in Europe, those types of things. They mostly develop their own materials so it's actually true development. We haven't found much out there that we think is better than what we have for test prep.

All the pilots that we run in our R&D groups do follow-up studies to see whether they make a difference to student outcomes. We have defined measures that we look for with everything that comes out of the simulation group. The simulation group also does peer-reviewed research for external publication. For example, they did one study on whether tablets would make a difference to outcomes when they were loaded up with certain types of content for the medical schools. Another one was on whether you can improve persistence using data analytics on predictors of student success. Then the group that does test prep, their outcomes are pretty easy to measure. We either get more people passing the test or we don't.

But we don't traditionally share a lot of our stuff externally. That hasn't been a priority. It's not that we're really against it, frankly. Most of the time, if somebody knows we've done some research and asks us if we'll share it with them, we do, but we just don't usually publicize it. Once in a while, we will partner with another university like we did for a study of online learning and we'll let them publish, but we usually don't attach our name to it." (President, Anonymous Institution).

Adrian Sannier, Chief Academic Technology Officer at Arizona State University: *"One of the drivers for the Action Lab is to do use-oriented research. The way we approach creating and delivering courses at scale is pretty much product-driven and not focused primarily on producing peer-review-research, 'Oh, we're going to get a grant from NSF and then we're going to set up a certain experiment and we're going to run that …' It's more like we're building an effective mechanism - the way I would describe this course is like it's a laboratory apparatus. Once that apparatus is constructed and data is beginning to flow, then we can start to talk about experiments we can design on top of the apparatus, and use the data that comes back to have meaningful things to say. I don't mean to say the peer-reviewed approach isn't important. I think that as these tests we perform begin to bear fruit, many of them will pass peer-review muster. But we won't be gated by that, we don't view peer-review as having to come first in order for us*

to be able to make decisions because, in practice, people actually make decisions in much less data-driven ways than that. In a sense, we're trying to land a basic implementation in the product space and then study the product and continuously improve it.

We're trying to be data-driven in the subjects where we can muster the scale and the attention to do it. As you move into Upper Division, courses are smaller and they're much more driven by the desires and the expertise of professors, so we're not focusing there. Quite frankly, that's not where the problem is. Upper division is not what needs attention. The entry level courses, where we're trying to level students up and get them in positions to be successful learners is where we focus. In many cases we find that those entry-level courses can sometimes be barriers instead of empowering students. These courses are good places to begin because there are lots of students taking them—some are succeeding, some are failing and you can start to use data to figure out, 'What can we do to help more people master these courses?'

So, how much you can do to assess the efficacy of a product is often a question of scale. It's one thing to talk about what an individual professor is doing - you can't do full blown studies at that level because you just can't afford it. Plus they're not really producing that much information. There usually aren't any controls. It's just really hard to do data-driven continuous improvement at cottage-industry scale.

Once you start doing stuff at the scale of our math program, where you're teaching 10,000 students a year over a period of five years, all of a sudden you're producing a tremendous amount of data. This last term we just deployed ALEKS for the first time at scale in College Algebra: for 3,500 on-campus students, for almost 800 online students, and for another 50,000 students on the internet. What we get back from ALEKS is terabytes of data about where each student placed when they first entered the course, which topics they had already mastered, which topics they had not mastered. We can see how much time they spend day by day, week by week; how they spend that time. Do they watch videos? Do they do problems? When they do problems do they struggle, do they stall? When they struggle, how do they respond? Do they drop out? Do they persist? What help do they seek? We are working with that entire map engaging a dedicated organization we call the Action Lab to pore over this information, doing comparisons and working with the course's instructional team to gain insights. The advantage is being able to look at these things at scale, with information from a very established curriculum with an entire set of instructors who are essentially trying to achieve the same ends using the same instruments to assess performance. The opportunity for continuous improvement using technology as a driver is really great. I believe we will eventually get to a level of sophistication where we can do meaningful comparisons among different products, but that's pretty hard to maintain and run.

I will say that we do provide differential experiences for students and measure those differentials. For example, the content that we're using to support the courses, these videos that we're using, we use what we call 'scholar sourcing' to understand the way in which these videos can be useful to students. We're creating a variety of different answers to frequently-asked questions in a mathematics domain, and then we're surfacing those to students who are struggling with various topics and then measuring effectiveness — 'Do students like a given video when it's shown to them? Do students change as a result of seeing them?' Say you were struggling with skill X, and we show you a video that was ranked relatively high for assisting with skill X, but then the next day you are still struggling. Well, one down for that video. By contrast, if we show you a video and the next day you're not struggling with skill X, then plus one for that video. In this way, we can use the experience of our developing scholars to inform the curation of the video collection. Also to drive, 'What product would make sense?' It's driven by what student questions go unanswered by the existing courseware."

Examples of IHEs own Investigations

A number of interviewees described the investigations they were conducting around specific EdTech products and strategies; a selection of these is presented here.

1) **Bridgepoint Education: YouSeeU Video-enabled Discussion Forum Tool**

Andrew Shean, Chief Academic Learning Officer, Bridgepoint Education: "*YouSeeU is a video-enabled discussion forum tool. You can use it beyond the discussion forum but it really enables video feedback, video-recording and sharing, and all sorts of different mechanisms that have great pedagogy associated with them, so I think it really enhances the quality of what happens in a discussion forum. Instead of just a prompt, YouSeeU would enable the faculty to simulate a case-study-like experience where they're the CEO and they're giving the student a problem via video and then the minute the faculty member clicks on the video student, the student has two minutes to respond back.*

So our study began small. We looked at the implementation of YouSeeU in one of our liberal arts courses, and we really tried to determine whether or not that would cause students to engage more by looking at measures by like time spent on task, and then qualitatively just the level of output that was taking place. What we're embarking on next year is to really look at scaling up and doing a variety of different types of YouSeeU integrations into the discussion forum and analyzing at a higher level what the outcomes are, so does it create higher level learning outcomes? Does it improve student engagement etc.? We'll conduct that and likely publish it with YouSeeU later in the year."

2) **Colgate University: Strategies to Engage Online Learners**

At Colgate University, Karen Harpp, Professor of Geology and Peace and Conflict Studies, and a small group of her undergraduate students experimented with the Open edX platform to determine whether and how it could be used to engage alumni and enhance the learning experience for students in Harpp's course *The Advent of the Atomic Bomb*. Prior to re-designing the course, they reviewed the research literature to identify effective strategies to engage online learners, such as creating small cohorts of students for discussions. As Harpp described it: "*We looked at how to design discussion questions that would generate more conversation, we looked into the use of blogging, which in the end we didn't use as a mechanism. We looked into participation rates in MOOCs in general—attrition rates from MOOCs, especially how to keep people engaged. Once the course was designed, the students assessed the levels of participation and engagement and compared them to the original version of the course. They documented their findings in a peer-reviewed publication: Engaging Alumni and Students Using Online Education Technology [EDUCAUSE Review, November 2015] by Allison Zengilowski, Sidhant Wadhera, and me.*"

3) **Salt Lake Community College: Starfish Student Retention System**

Ryan R. Hobbs, Director of eLearning at Salt Lake Community College (now at Dixie State University): "*With our student retention system we're trying to move the needle on student success and completion, so we're looking at retention rates. We're looking at completion rates. We're looking at how quickly the product was adopted and the implementation costs. We're looking at the usability ratings in terms of what people think about the product. We've tried to create a benchmark of where we are now, and we are trying to control for all the other variables that are related or unrelated to Starfish's adoption. Later, we will try to identify the impact of adopting Starfish.*"

4) University of Central Florida: Realizeit Adaptive Learning Platform

Thomas Cavanagh, Associate Vice President, Distributed Learning, University of Central Florida (UCF) described research work on UCF's adaptive learning platform, Realizeit, in collaboration with the vendor during a pilot: "*We really liked the idea of co-publishing. It was part of our initial conversations with Realizeit. I won't say that that was the main reason we chose them, but that was a real, nice bonus and it's something that we are particularly interested in, that kind of partnership. We don't often have it with a vendor, but these folks were really interested in it.*

They have access to data and information from their side of the house that we don't have access to, and likewise we have things that they don't have. By combining some of those data sets, we've been able to paint a picture of the pilot that's pretty comprehensive and has resulted in peer-review publications [see [Dziuban, Moskal, Cassisi, & Fawcett, 2016](); [Dziuban, Moskal, & Hartman, 2016](); [Dziuban, Moskal, Johnson, & Evans, 2017]()].

We've discovered things like you can identify the students who will do poorly almost immediately. By the second module, if a student is doing poorly, there's almost 100% chance that they're going to do poorly the rest of the term. Knowing that, you can intervene much quicker to see if you can get them back on track. In the course we were looking at, about 10% of the student population fell into that category. It was apparent in Week Two that they were not going to pass when you went back and analyzed the data. They didn't bounce up and down. It was like a straight line, 45 degrees down. Now we can recommend to faculty, 'Look, if you pay attention to this population in Week Two and see what's happening, you might be able to positively impact these students.' I think that's really valuable and us joining forces like that to do deep research into these courses will only benefit both sides. We've helped them with their platform and they're helping us with our practice."

5) Anonymous: Active Learning with Online Quizzes, Clickers, and Flipped Classrooms

"*We investigated the effects of active learning and flipped classrooms in my own, team-taught, large intro course (over 300 students). In summary, we followed the classic recipe of moving content transfer outside of the classroom and then used the classroom time to work with students, rather than lecturing. I used simple online quizzes to assure textbook reading before class, and iClickers in lecture. Other colleagues used variations of this - online videos, Piazza, etc. In all cases, the student engagement was significantly increased.*

We measured outcomes by comparing performance on exams, student satisfaction using surveys, and pre/post course testing and Hake gains—all of this pre and post flipping. Most of these improved quite a bit, across all classes that were flipped. I think all of this only confirms already-existing research, but it was very effective to see it with my own eyes. Colleagues in another department also flipped their classes and did more detailed (internal) research on the effectiveness."

6) Action Research to Inform Effective Use of Educational Technology

Steven Goss, Vice Provost of Digital Learning, Teachers College, Columbia University: "*My ideas about what is effective practice online come mostly through past research that I've done at NYU [New York University], and from when we did action research at Bank Street which we presented at AERA [American Educational Research Association] and OLC [Online Learning Consortium]. I would say it's the crux of what changed my thinking about what research might look like around teaching and learning online.*

So, for example, we did a study working with the faculty at Bank Street where we were looking at how to increase student engagement in online forums. The faculty looked at existing research and we put together a number of different resources and a framework for how students should be thinking about discussions in an online forum.

The action research we did on that framework showed us that the structure we put together, which was to explain to the students that forums were like a volley-serve type conversation, was actually ineffective. We found through interviews with the students that they really just started feeling as though there was no structure to the conversation, just people back and forthing and not really giving time to reflect or deepen the discussion.

So from there, we tried to develop less back and forth volume, and more of a cocktail party situation where students could move between different conversations. Out of that came some good findings that I've been using a lot in the work that I do. So, for creating forums, we came down to two things that you really needed to be thinking about: first, letting the students know the types of roles that they can play inside the forum, not what it means to have a conversation. So those roles were things like you need to validate what people are saying, you need to give critical feedback, you need to offer resources, you need to deepen the conversation by maybe taking it away from its initial point. And secondly, different structures can be used that aren't just full-group discussions, like book groups, one-on-ones, pair and share, or synthesis teams."

What research would be useful?

When asked what research would be useful for EdTech decision-making, interviewees came up with several suggestions. A few were about the impact of specific academic software applications on student outcomes such as improvements in course grades, retention, and completion. For example, Joseph A. Moreau, Vice Chancellor of Technology at Foothill-De Anza Community College District, was interested in comparing outcomes for students using MyMathLab with outcomes for students using no technology or using a different technology application.

Several interviewees claimed that the most valuable research for them would be case studies of product implementations at other IHEs, especially if they were peer institutions and reported impact on student outcomes as well as on the specifics of implementation and populations involved. Ryan R. Hobbs, Director of eLearning at Salt Lake Community College (now at Dixie State University), explained exactly what he was looking for: "*It'd be helpful to know 'This is what it [the EdTech product] did for the University of X. This is what student outcomes looked like before they had the product, this is what they looked like after, and this is the impact that it had.' There are some case studies like that, but very rare. Being a community college, we find more value in research about our community college peers, especially our true peers, our benchmarking peers. Those that have similar enrollment sizes and budgets and FTE counts, et cetera. At the same time, we don't rule out looking at research done at a university, but it can be hard to transfer.*" A Senior Administrator at a for-profit university added that having the opportunity to speak directly with some of the IHE personnel involved in a case study would be ideal in order to elicit perspectives that might not be publicly reported.

Chris Edwards, Assistant Vice President for eLearning at University of Cincinnati, advocated strongly for multi-site longitudinal studies involving several IHEs: "*If we could begin to coordinate efforts across multiple institutions, I think then we will begin to build a body of evidence. When we are all doing this by ourselves, working alone, it's very difficult. Some of the most useful information out there is some of the work that EDUCAUSE does, some of their annual surveys, but it's very high-level stuff. It's not down to*

the product level, it's more trends. I think doing that same sort of work down a little closer to the operational world would be interesting and helpful."

Steven Goss, Vice Provost of Digital Learning at Teachers College, Columbia University, expressed his belief in the value of action research as a practical application of research methods to continuous improvement of instruction: "*I guess what I'm more interested in when I do research isn't the theoretical but more of the practical. That's where action research really helps, because it allows us to not know everything upfront but to start with what we know from experience and continuously improve our practice. You try things, see what the results are for students and then you reflect on that and you come up with some hypothesis that you can then go test again or work with further.*" Goss further argued that research investigating the difference between face-to-face and online classes is not valuable given that so many courses are delivered partially online and partially on-site. Instead, Goss proposes that research efforts should focus on assessing the impact of different online instructional strategies on student learning.

For some interviewees, research would be more useful if it was less focused on tools and products that are already in use and more on how to address pedagogical challenges going forward. Shawn Miller, Director - Center for Instructional Technology at Duke University, articulated this position: "*What's a teaching and learning challenge that could be helped or overcome by a certain type of technology that maybe doesn't exist as yet? Is it attention span? Is it retention? Is it dealing with large classes? Is it getting students to contribute to a global conversation? Even if the technology doesn't exist today to do that, what would that possibly look like and what would its function be? How could it help? More like an R&D kind of thing. That would probably inform me better than looking back on something that we've already made a decision about.*" Similarly, the President of another IHE noted that one of his institution's biggest challenges in dealing with its mostly adult learners is "*…how to get them in the right mindset to recover when they have their first challenge, as they all do.*" He described trialing several tools that purport to teach grit, attempting to come up with a solution through internal R&D, and looking for relevant research on the topic conducted by other IHEs—all to no avail so far.

Others volunteered suggestions about how to share and access existing results of investigations of EdTech products and strategies. Greg Karzhevsky, Chancellor of Jersey College, detailed the kind of information that would be useful for IHEs to share in some sort of repository organized by program type: "*It would be great if there were some consolidating higher education service that kept track of the technology available for various types of educational programs. I'm going to speak from nursing where we have a whole list of challenges - everything from substituting simulation experiences for live clinical sites, to course-level assessment testing and benchmarking, to NCLEX preparations, to how to make sure that your faculty is teaching at the right application level as opposed to knowledge level. That's just the one program. If you extend that to any program, whether it's physical therapy or even philosophy, how do you know what products or what technologies you can use to gain insights into whether a particular student is meeting the objectives of the program and document that? It would be great to have some sort of service that categorizes products by the various programs and identifies the challenges that each institution has within that program, and has a place for schools to report on their experiences, best practices, and uses of EdTech to try to solve those problems.*"

Michelle R. Weise, Chief Innovation Officer of the Sandbox ColLABorative at SNHU, described the Sandbox's efforts to publicly share their findings on EdTech products and expressed hopes that others would follow suit: "*...for the most part, there are no published studies about any of this work, so we're hoping that at least if we make this first step in presenting, 'Hey, here's all the stuff we're looking at, and this is all the stuff we're thinking about and we've synthesized it into what we think is a readily-*

consumable white paper, brief, blog, or podcast.' We want to share that with everyone we can. Honestly, I think even though it's not academic research per se, people are looking for that information just to help them at least get a first look at the landscape." Weise also pointed to UPenn's sandbox unit which aims to make EdTech pilot data more accessible for analysis and to incentivize faculty to use the data to conduct "*full-fledged research projects.*"

Finally, Matthew Rascoff, Vice President of Technology-based Learning and Innovation at University of North Carolina (now at Duke), proposed a tiered system of funding to support EdTech research at amounts appropriate to the level of higher education investment in the product or strategy. He emphasized that, at all levels, the research needs to be methodologically sound and independently conducted to avoid bias from undue vendor involvement. In Box 25, Rascoff explains his thinking on the topic and how research funders could collaborate to develop a national research agenda for EdTech.

Box 25: *Tiered Levels of Funding for EdTech Research*

Matthew Rascoff, Vice President of Technology-based Learning and Innovation at University of North Carolina (now at Duke): *"What I'm arguing for is to have bands of investment in EdTech and specify the level of research rigor that is appropriate to each level of investment. I think for big areas like adaptive learning, randomized control trials [RCTs] obviously need to happen. RCTs are an appropriate methodology for high stakes investments where the ROI makes sense to invest a few hundred thousand in a study for an area that's going to garner hundreds of millions or billions of investments. That makes sense.*

I think we need an approach that calibrates the appropriate methodology to the level of investment in a particular area. I'm thinking of the new short cycle research methods that the USED [U.S. Department of Education] is funding. For free apps that are pretty low stakes and low cost, there should be some mechanism for gathering data; it doesn't need to be a randomized control trial…then I'm interested in can we do automated writing scoring? It's an important, emerging area. It's not worth a million dollars of research. It's probably worth a hundred thousand dollars per year of research about the application of that in writing centers.

What I'm saying is it's not all or nothing and I think where the [What Works Clearinghouse](#) fell down is that they just applied the gold standard to absolutely everything so in some categories almost nothing "passed." Then it's not as useful a resource as it could be. I think what we need are tiers that are not saying, 'You're a bad product if you don't meet the standard.' It's more of a, 'This is the level of investment in research that's appropriate for a product that's used in X number of classrooms.'

I don't know what the right mechanism to do this is, but maybe some of the philanthropists could get together and say, 'Okay, we're going to pool our resources and make sure these areas get this level of funding and these more important areas get more level of research funding.' Something like that. I don't think it's any one person's job. I think it's sort of a collective impact question and you'd need all the major research funders to get together and say, 'Here's what we collectively believe. You take that project and I'll take this project and we'll come up with a national research agenda.'"

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Conclusions

The landscape for EdTech decision-making

EdTech decision-makers are in the hot seat, sandwiched between end users who range from intransigent Luddites to technophiles, and vendors who have answers to everything—even when there is no question to start with. EdTech tools and their applications are proliferating in an environment where higher education is viewed as a lucrative market with much work to do to keep up with the 21st century, to provide accountability data to regulators and the public, and to safeguard students' data privacy and other EdTech-related rights. As if these pressures are not enough to deal with, we are now expecting EdTech decision-makers to ensure that their choices lead to better student outcomes—a standard not imposed on many other decisions in higher education. Even faculty tenure is not based on solid evidence that students have learned anything from their courses. But EdTech, apparently, is expected to be the silver bullet for many of higher education's challenges, and EdTech decision-makers are under the gun to deliver on these expectations.

Information and influences

Sitting at the nexus of these various demands, decision-makers struggle to process an excess of information on EdTech products and trends. They constantly gather information, mostly from colleagues at their own and other institutions of higher education, and most often at EdTech-related network events such as conferences and consortium meetings. While there is safety in being a "near-follower," there is also a risk of becoming trapped in a higher education echo-chamber. Institutions that were identified as EdTech thought leaders, change makers, and innovation leaders were also the ones that were more likely to step outside of higher education circles and talk to startups and organizations in other fields about how they solved their challenges with technology, and how they overcame impediments to productive implementation. But fostering an innovative culture requires incentivizing people to take the risk of trying new strategies, and making room for error as well as trial. It also helps to be clear about the goals for innovation, with "staying at the cutting edge" not being an adequate answer when public funds and students' time are on the line.

Decision-making practices

There is clearly a tension at many IHEs between starting the decision-making process with needs vs. starting with the solutions. In some instances, IHEs follow a (more or less) rational model of decision-making, first identifying the needs and subsequently looking for appropriate EdTech tools to address them. But in others, the IHE starts with the EdTech tools and tries to match them up with unsolved problems, whether or not there is substantive evidence to suggest they are an appropriate solution. This is the garbage can model of decision-making (Cohen, March, & Olsen, 1972). Some IHEs work from both ends of the spectrum, taking pains to keep track of ongoing needs at the institution, while at the same time staying abreast of available solutions.

We found evidence that IHE decision-making strategies often incorporate several elements of multi-criteria decision-making. They frequently start with more than one objective for the decision, involve a variety of stakeholders, and accommodate both objective assessments and value judgments as decision criteria in the selection process. In some cases, each EdTech solution being considered for adoption is rated or ranked against the decision criteria by stakeholders. In a few instances, different importance

weights are assigned to each decision criterion. Final decisions, most often made by senior administrators for large acquisitions, but sometimes by majority vote, are informed by how well each EdTech option stacks up against the pre-determined list of decision criteria.

In selecting among various EdTech options, decision-makers generally considered user experience the most important criterion, followed by features and functionality. Implementation feasibility, costs, return on investment, and vendor characteristics were considered often but were assigned slightly less weight. Numerous interviewees expressed the desire to develop mutually beneficial and ongoing partnerships with vendors, allowing for an alignment of organizational and product roadmaps, and for user input to influence future EdTech developments.

A common theme that arose with respect to ensuring successful outcomes for EdTech decision-making is the need to obtain buy-in from all those who will be involved in implementing and using the product or strategy. While non-profits generally aim to build buy-in during the decision-making process, for-profits are more likely to make a decision centrally and work on building buy-in during implementation.

When it comes to the process of making decisions among potential EdTech options, there needs to be a balance between spending excessive amounts of time, money, and effort trying to choose between only marginally different product options, and making decisions so swiftly as to preclude adequate involvement of stakeholders or anticipation of implementation challenges. Non-profits are more likely to err to the former position, and for-profits to the latter. However, some decisions are devolving to departments and individual faculty members, particularly for items that cost little but facilitate the work of researchers and educators. This shift brings positives and negatives: freedom of choice and freedom from "red-tape" leads to redundancy in functionality among acquired tools, unsupportable products, and risks of clicking through license agreements that do not conform to regulations on critical issues such as data privacy. Finding ways to standardize and streamline EdTech acquisitions, and to reduce redundancy amongst supported tools is a priority.

There is little doubt that EdTech decisions should be made collaboratively by a mix of administrative and academic leaders, and IT experts. Adequate attention must also be paid up front to the potential demands of scaling up desirable applications, including change management, total cost of ownership, ongoing support, training, and adequate digital infrastructure.

The role of research in EdTech decision-making

All EdTech decision-makers conduct research, loosely defined, to inform their decision-making. Most commonly this involves gathering input from faculty, staff, and students about their EdTech-related needs and experiences with EdTech options, and reviewing student outcomes after implementing an EdTech strategy or product. The emphasis is more on user experience and whether the technology is well implemented than on whether it improves student learning. An abundance of digital data may yield the perception that EdTech decisions are being made based on evidence, but, as many researchers would argue, data are only as useful as the questions that are asked of them. Scientifically-based research on EdTech is rarely consulted. This is partly because so little exists, but also because there appears to be a strong preference among higher education decision-makers for locally-produced information. The importance of local context in EdTech implementation was a constantly recurring theme.

Duplication of effort occurs across IHEs with many of the same EdTech products being piloted without results being shared. There is clearly room for an online repository in which IHEs can share results of their EdTech pilots and investigations of the results of EdTech use. This could, perhaps, be combined with a platform that facilitates EdTech acquisitions along the lines of University of North Carolina's Learning Technology Commons (see Box 3). While there may be validity to the claims that the importance of local context limits the usefulness of pilot results obtained at other IHEs, efficiencies could be gained from collaboration across IHEs to conduct multi-site pilots at large scale and with diverse users. These would permit a deeper investigation into how well EdTech products work under different circumstances. Furthermore, the inclusion of comparison (or "control") groups and an emphasis on measuring actual learning, as opposed to grades earned or course completions, would provide more rigorous evidence regarding impact on student outcomes. There are, however, decisions for which research may not be relevant because the technology simply fulfils a basic practical need.

Funders could support the production of better research evidence to inform EdTech decision-making by establishing tiered levels of funding for EdTech. The degree of methodological rigor should mirror the level of higher education investment in the product. For example, the acquisition of a software package that costs $20,000 might merit a few faculty and student tests in a user experience lab, along with an evaluation by IT for compatibility with existing systems. On the other hand, adaptive learning systems in which universities might collectively invest hundreds of millions of dollars would merit a large-scale, multi-site RCT to assess impact on student learning.

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Recommendations

For EdTech Decision-makers

    i.   Beware of living in an echo-chamber: talk to people outside of higher education.

    ii.   Make sure decisions are being led by clearly identifiable pedagogical needs rather than simply by what technology is out there.

    iii.   Involve stakeholders, including faculty, staff, and students early in the decision-making process to build buy-in and avoid bumpy rollouts. This may include using creative ways of understanding faculty challenges during the needs assessment phase.

    iv.   Check your roadmap is compatible with your vendor's roadmap.

    v.   Streamline and standardize the EdTech procurement process to improve efficiency of acquisitions across campus; consider developing standard Terms and Conditions for EdTech vendors.

    vi.   Be sure to consider all ancillary costs of EdTech acquisitions such as training, new hires for implementation, infrastructure upgrades, and bandwidth requirements.

    vii.   Anticipate and plan change management strategies as part of the EdTech selection process.

    viii.   Focus on the functionalities that faculty and students can realistically use and don't overwhelm users with all functionalities of new EdTech at once.

    ix.   Be prepared for multiple rounds of training; provide refreshers as the technology evolves.

    x.   Consider using Net Promoter Score to gather faculty and student feedback on EdTech being used, in addition to more traditional surveys.

    xi.   Step up the rigor of pilots by comparing results for students using the new product or strategy vs. similar students not using it, or by conducting more than one pilot in different contexts or with different user groups.

    xii.   Consider multi-site pilots with other IHEs.

    xiii.   Develop valid and reliable measures of learning rather than simply assessing pass rates, retention, and completion.

    xiv.   Encourage faculty and project managers to share EdTech pilot and study findings in a repository to share with other IHEs.

    xv.   If you want to be innovative, provide incentives and make sure the culture accommodates error as well as trial.

For Researchers

i.   Move away from simply asking whether EdTech is helpful or unhelpful. It's here to stay, so focus on what pedagogical strategies it can support and how to use it better to improve student learning and other outcomes.

ii.   Help identify solutions to the current grand challenges of higher education, e.g., maintaining the student's attention span; increasing retention and completion; simultaneously serving students with widely varying levels of preparation and self-motivation; reducing costs while maintaining quality of education; providing ongoing opportunities for "skilling up;" improving the transparency of credentials.

iii.   Use cases and studies of real-world implementations are more useful to decision-makers than experiments conducted under special conditions.

iv.   Differentiate findings by context and types of student.

v.   Find valid ways to measure actual student learning.

vi.   Investigate success factors for scaling up implementation of EdTech interventions.

For EdTech Vendors

i.   Do your due diligence on the IHE and tailor your pitch to their specific needs.

ii.   Transparency around products is critical - be clear about what is currently functional and what is aspirational.

iii.   Aim for mutually beneficial relationships with "partners," rather than simply offering a product to "clients" or "customers."

iv.   To build long-term relationships and customer loyalty, be prepared to customize your product to meet user needs.

v.   Stay open to the idea that researchers at IHEs may have an intellectual and non-commercial interest in opening up the black box of EdTech products and helping to improve them.

vi.   Consider a pro bono exchange with schools for EdTech research – you provide the EdTech and support for free, they do the research for free and publish it.

For Funders

i. Fund a hub for sharing results of EdTech pilots among IHEs, fund independent researchers for peer-reviews, quality ratings and assessments of applicability to other contexts.

ii. Incentivize grantees to build in time and resources to share their internal study findings with other IHEs.

iii. Develop a tiered system of funding to support EdTech research at amounts appropriate to the level of higher education investment in the product/strategy.

iv. Encourage IHEs to focus on measuring student learning.

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References

Acquaro, P.E. (2017). *Investigation of the selection, implementation, and support of online learning tools in higher education.* (Doctoral dissertation). Retrieved from: https://www.edtechdecisionmakinginhighered.org/edtech-research-papers

Asen, R., Gurke, D., Conners, P., Solomon, R., & Gumm, E. (2013). Research evidence and school board deliberations: Lesson from three Wisconsin school districts. *Educational Policy*, *27*(1), 33–63.

Birkland, T.A. (2011). An introduction to the policy process: Theories, concepts, and models of public policy making (3rd ed). Armonk, NY: ME Sharpe.

Bonabeau, E. (2003). Don't trust your gut. *Harvard Business Review*, *81*(5), 116-123.

Bowers, A. J., Shoho, A. R., & Barnett, B. G. (2014). Considering the use of data by school leaders for decision making: An introduction. In A. J. Bowers, A. R. Shoho, & B. G. Barnett (Eds.), *Using data in schools to inform leadership and decision making* (pp. 1–16). Charlotte, NC: Information Age Publishing Inc.

Braybrooke, D., & Lindblom, C. (1963). *A strategy of decision*. New York: The Free Press.

Brewer, G.D., & deLeon, P. (1983). *The foundation of policy analysis*. Chicago: Dorsey.

Cartwright, N., & Hardie, J. (2012). *Evidence-based policy: A practical guide to doing it better*. Oxford, UK: Oxford University Press.

Cohen, M. D., March, J. G., & Olsen, J. P. (1972). A garbage can model of organizational choice. *Administrative Science Quarterly*, *17*(1), 1-25.

Deming, D. J., & Figlio, D. (2016). Accountability in US education: Applying lessons from K–12 experience to higher education. *The Journal of Economic Perspectives*, *30*(3), 33-55.

Dziuban, C., Moskal, P., Cassisi, J., & Fawcett, A. (2016). Adaptive learning in psychology: wayfinding in the digital age. *Online Learning, 20*(3).

Dziuban, C., Moskal, P., & Hartman, J. (2016). Adapting to learn, learning to adapt. Research bulletin. Louisville, CO: *ECAR*, September 30, 2016.

Dziuban, C., Moskal, P., Johnson, C., & Evans, D. (2017). Adaptive learning: A tale of two contexts. *Current Issues in Emerging eLearning, 4*(1), Article 3.

Edwards, W. (1954). The theory of decision making. *Psychological Bulletin*, *51*(4), 380.

Feuer, M.J. (2015). Evidence and advocacy. In M.J. Feuer, A.I. Berman, & R.C. Atkinson. *Past as prologue: The National Academy of Education at 50. Members reflect.* (pp. 95-101). Washington, DC: National Academy of Education.

Finnigan, K. S., Daly, A. J., & Che, J. (2013). Systemwide reform in districts under pressure: The role of social networks in defining, acquiring, using, and diffusing research evidence. *Journal of Educational Administration*, *51*(4), 476-497.

Goldstein, P. J., & Katz, R. N. (2005). *Academic analytics: The uses of management information and technology in higher education* (Vol. 8). EDUCAUSE Center for Applied Research.

Gormley, W.T., Jr. (2011). From science to policy in early childhood education. *Science*, *333*(6045), 978-981.

Hanushek, E. A., (2015). Education's double helix. In M.J. Feuer, A.I. Berman, & R.C. Atkinson. *Past as prologue: The National Academy of Education at 50. Members reflect.* Washington, DC: National Academy of Education, (pp. 309-312).

Ho, W., Dey, P. K., & Higson, H. E. (2006). Multiple criteria decision-making techniques in higher education. *International Journal of Educational Management*, *20*(5), 319-337.

Honig, M. I., & Coburn, C. (2008). Evidence-based decision making in school district central offices: Toward a policy and research agenda. *Educational Policy*, *22*(4), 578–608.

Ikemoto, G. S., & Marsh, J. A. (2007). Cutting through the "data-driven" mantra: different conceptions of data-driven decision making. *Yearbook of the National Society for the Study of Education*, *106*(1), 105–131.

Johnson, L., Adams Becker, S., and Hall, C. (2015). *2015 NMC technology outlook for Australian tertiary education: A Horizon Project regional report.* Austin, Texas: The New Media Consortium.

King, J. A., & Pechman, E. M. (1984). Pinning a wave to the shore: Conceptualizing evaluation use in school systems. *Educational Evaluation and Policy Analysis*, *6*(3), 241–251.

Lai, M. K., & Schildkamp, K. (2013). Data-based decision making: An overview. In K. Schildkamp, M. K. Lai, & L. Earl (Eds.), *Data-based decision making in education* (pp. 9–21). Dordrecht, Heidelberg, London, New York: Springer.

Lindblom, C. (1959). The science of muddling through. *Public Administration Review*, *19,* 79-88.

Majone, G. (1989). *Evidence, argument, and persuasion in the policy process*. New Haven and London: Yale University Press.

Marsh, J. A., Pane, J. F., & Hamilton, L. S. (2006). *Making sense of data-driven decison making in education: evidence from recent RAND Research* (No. OP-170-EDU). RAND Corporation.

Merriam, S. B., & Tisdell, E. J. (2015). *Qualitative research: A guide to design and implementation*. John Wiley & Sons.

Mustafa, A., & Goh, M. (1996). Multi-criterion models for higher education administration. *Omega*, *24*(2), 167-178.

Nutley, S. M., Walter, I., & Davies, H. T. O. (2007). *Using evidence: How research can inform public services*. Bristol, UK: Policy Press at the University of Bristol.

Penuel, W.R., Briggs, D.C., Davidson, K.L, Herlihy, C., Sherer, D., Hill, H.C., Farrell, C.C., & Allen, A-R. (2016). *Findings from a national survey of research use among school and district leaders* (Technical Report No. 1). Boulder, CO: National Center for Research in Policy and Practice.

Rascoff, M. (2016, February 8). *How UNC is trying to make ed tech better.* [Web log post]. Retrieved from: https://medium.com/@mzrascoff/how-unc-is-trying-to-make-ed-tech-better-65352ee50ec5

Resnick, L. (2015). The National Academy of Education's role in bridging research and practice. In M.J. Feuer, A.I. Berman, & R.C. Atkinson. *Past as prologue: The National Academy of Education at 50. Members reflect.* (pp. 325-328). Washington, DC: National Academy of Education.

Saxberg, B. (2016, October 5). The role of research in higher ed decision-making. *EdTech Efficacy Research Academic Symposium*. [Web log post]. Retrieved from: http://curry.virginia.edu/symposium/the-role-of-research-in-higher-ed-decision-making/

Simon, H. (1957). *Models of man: Social and rational*. New York: Wiley.

Simon, H. A. (1976). From substantive to procedural rationality. In *25 years of economic theory* (pp. 65-86). New York, NY: Springer US.

Tseng, V. (2012). *The uses of research in policy and practice* (Social Policy Report No. V26#2). Ann Arbor, MI: Society for Research in Child Development.

Watters, A. (2012, May 19). What is "Ed-Tech"? *Hack Education*. [Web log post]. Retrieved from: http://hackeducation.com/2012/05/19/ed-tech-definition

Weiss, C. H. (1977). Research for policy's sake: The enlightenment function of social research. *Political Analysis*, *3*, 531-545.

Weiss, C. H. (1979). The many meanings of research utilization. *Public Administration Review*, *39*(5), 426-431.

Zengilowski, A., Wadhera, S. & Harpp, K. (2015) Engaging Alumni and Students Using Online Education Technology. *EDUCAUSE Review*, November 2015.

Zopounidis, C., & Doumpos, M. (Eds.). (2017). *Multiple criteria decision making: Applications in management and engineering.* New York, NY: Springer.

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Appendix 1: Methods

Sample and recruitment

We addressed our research questions by interviewing decision-makers in higher education. To obtain a sample of interviewees, two sampling strategies were employed to balance the likelihood of participation with the likelihood of obtaining a fair picture of the range of decision-making strategies across institutional types. First, a purposive sample of known IHEs and individual contacts was established by soliciting suggestions from members of Working Group B. Names and roles were crowd-sourced by Working Group members using a Google Spreadsheet stratified by six types of institutions:

- ➢ 2-year private for-profit
- ➢ 2-year private non-profit
- ➢ 2-year public
- ➢ 4-year private for-profit
- ➢ 4-year private non-profit
- ➢ 4-year public

In addition, suggestions were solicited from approximately 150 other symposium members via a Google Form survey sent out twice by email in the fall of 2016. However, this survey yielded very few responses so the vast majority of the purposive sample individuals who were invited to participate in an interview were proposed by Working Group B members.

Individuals in the purposive sample were emailed an invitation to participate in the interview. If the contact was unknown to the interviewer, the invitation was preceded by an email introduction from the individual who put forward the potential interviewee's name. We expected that the participation rate by individuals in this sample would be high given a personal connection but we also recognized that these individuals and the institutions they represented were not likely to be representative of all IHEs in the U.S. In particular, most of Working Group B's known contacts are at 4-year IHEs. One follow-up email was sent in the event the first invitation did not elicit a response. Of the 38 IHEs invited to participate, 31 agreed to an interview or suggested someone else at the same institution more appropriate to invite, who subsequently agreed. The resulting participation rate was very high at 81%.

To address the lack of broad representation of IHEs across the U.S. in the purposive sample, we also created a stratified random sample of institutions. We used the following criteria to identify the potential population of IHEs in IPEDS: U.S.-based, Title IV eligible, 750+ undergraduates, graduates, or a mix. All institutions in IPEDS meeting these criteria were assigned a random value from 0 to 1 using the Stata function runiform(), and, for each of the 12 categories detailed below, we selected up to ten schools by picking the lowest randomly assigned numbers. After our first round of sample recruitment, we found participation from the private sector institutions was low, so we drew a second random sample of private institutions (2-year and 4-year). We followed the same procedure as above, but excluding the institutions already drawn from the first sample before drawing a second sample from the eligible institutions, and drawing up to 20 institutions in each of the categories.

Categories of IHEs:
2-year for-profit, no distance education offered
2-year for-profit, distance education offered
2-year non-profit, public, no distance education offered

2-year non-profit, public, distance education offered
2-year non-profit, private, no distance education offered
2-year non-profit, private, distance education offered
(Same six categories again but for 4-year IHEs)

As there were fewer than 10 IHEs in some categories, we obtained a total of 104 IHEs in the first random sample, and 66 additional IHEs from the second random sample. As Table 15 shows, there are very few institutions that meet our criteria in some of these categories, such as private, non-profit 2-year institutions (only 5 institutions total), so we reached out to all institutions in that category. Additionally, there were 26 private institutions offering less than 2-year degrees with distance education, one such institution with no distance, and one public institution with no distance education offering less than 2-year degrees, but we did not include these institutions.

A total of 42 U.S. IHEs participated in the study.
  ➢ 71% were from the purposive sample and 29% from the random sample
  ➢ 19% were 2-year IHEs and 81% were 4-year IHEs
  ➢ 19% were for-profits and 81% were non-profits
  ➢ 33% were public IHEs and 67% were private IHEs.

Table 15. *Number of U.S. Institutions that Participated in Interviews*

Type of institution	No. of institutions in IPEDS§ meeting our criteria	Purposive sample via known contacts	Random sample	Total
2-year for-profit	88	2	3	5
2-year private non-profit	5	1	1	2*
2-year public	758	5	2	7
4-year for-profit	155	6	2	8**
4-year private non-profit	919	7	2	9
4-year public	678	9	2	11
Total	**2,603**	**30**	**12**	**42**

*Very few institutions fall into this category in IPEDS and all were contacted.
**One institution in this category appeared in both the purposive and random sample but is only counted in the purposive sample.
§The Integrated Postsecondary Education Data System is a system of interrelated surveys conducted annually by the U.S. Department of Education's National Center for Education Statistics (NCES) that gathers information from every college, university, and technical and vocational institution that participates in the federal student financial aid programs.

In general, we found that 2-year IHEs were less likely to agree to participate in the study than 4-year IHEs. Individuals from for-profit entities seemed just as willing to participate in the study as those from non-profits but in some cases needed to obtain permission from Public Relations and legal departments to participate and be quoted.

We used public sources (e.g., the IHE's web site) to identify the CIO or Chief Technology Officer or other EdTech decision-maker for each of these IHEs. We emailed this person to inquire as to whether (s)he would participate in an interview or recommend someone else at the IHE that we could invite to do so. We started at the top of the list for each of the 12 categories and worked our way down. Based on prior experience of "cold-calling," we expected that two out of 10 of the IHEs in each category would agree to an interview, or approximately a 20% participation rate. As shown in Table 16, we reached out to a total of 67 institutions (and 79 individual decision-makers), and received agreement from 13 of these institutions to participate (a participation rate of 19%).

Table 16. *Random Sample Recruitment and Participation*

Type of institution	No. of people invited	No. of institutions invited	No. of institutions agreeing to participate
2-year public	11	10	2
2-year for-profit	19	17	3
2-year private non-profit	9	5*	1
4-year for-profit	9	8	3**
4-year private non-profit	19	17	2
4-year public	12	10	2
Total	**79**	**67**	**13**

*No more institutions meet our criteria
** One of these institutions also appeared in the purposive sample so we categorized it as purposive for our analysis.

Our final set of U.S. interviewees consisted of 51 individuals, 35 (69%) from the purposive sample and 16 (31%) from the random sample.

Interviewee background

Almost three quarters of the U.S.-based interviewees were male. Table 17, Table 18, Table 19, Table 20, and Table 21 provide details on the types of IHE the interviewees represented, their professional roles, their highest degree earned, their field of training (based on their highest degree), and the number of years for which they had worked in an EdTech decision-making role. The 51 interviewees reported between 6 months and 35 years of EdTech decision-making experience, with an average of just over 14 years.

Table 17. *U.S.-based Interviewees by Type of Institution*

Type of institution	Number of interviewees	% of interviewees
2-year private non-profit	2	4
2-year private for-profit	6	12
2-year public	8	16
4-year private non-profit	13	26
4-year private for-profit	10	20
4-year public	12	24
Total	**51**	**100**

Table 18. *U.S.-based Interviewees' Professional Roles*

Professional role	Number of interviewees	% of interviewees
e-Learning administrators	18	35%
Presidents	9	18%
CIOs	8	16%
IT personnel	7	14%
General administrators	3	6%
Chief Academic Officers	2	4%
Faculty	2	4%
Innovation Officers	2	4%
Total	**51**	**100**

Table 19. *U.S.-based Interviewee's Highest Degree*

Interviewee Highest Degree	Number of interviewees	% of interviewees
B.A./B.S.	8	16
M.A./M.S./M.Ed./M.B.A./M.Eng.	19	37
Ed.D. or Ph.D.	23	45
Unknown	1	2
Total	**51**	**100**

Table 20. *U.S.-based Interviewee Field of Training*

Field of interviewee's highest degree	Number of interviewees	% of interviewees
Humanities/Sciences/Other	12	24
Education	11	22
Computer Science / Information Science	10	20
Instructional Design / Educational Technology	9	18
Business	8	16
Unknown	1	2
Total	**51**	**100**

Table 21. *Number of years U.S.-based Interviewees Have Worked in an EdTech Decision-making Role*

Number of Years in EdTech decision-making	Number of interviewees	% of interviewees
Up to 5 years	8	16
6-10 years	14	28
11-20 years	18	35
21-30 years	8	16
Over 30 years	3	6
Total	**51**	**100**

Interview procedure

Fifty-two EdTech decision-makers from 43 different institutions of higher education participated in forty-seven interviews between September 2016 and April 2017. In seven cases, two or three individuals were interviewed at the same institution either in a joint interview or separately. Quantified findings in our report use interviews as the unit of analysis.

Forty-five of the interviews followed the same semi-structured protocol (see Appendix 3) and these form our main study sample. One additional interview focused specifically on the use of Net Promoter Score in higher education for gathering student and faculty feedback. This is reported in Box 13. The 47th interview was with an interviewee from a university outside the U.S. and is therefore not included in the main sample of 45 interviews. The purpose of the non-U.S. interview was to provide a counterpoint to the U.S. perspective. EdTech decision-making lessons learned from this interview are reported separately in Box 15.

The regular interview protocol began by eliciting information about where the interviewee obtains information on EdTech products and trends; what individuals or organizations (s)he perceives as opinion leaders, change makers, or innovation leaders in EdTech; and who generally participates in EdTech decisions at the institution. Subsequently, the interviewee was asked to identify one particular EdTech decision in which (s)he participated recently enough to remember the details of the process, and to answer many detailed questions about the goals of the decision, the stakeholders involved, and the decision-making process itself. The interview ended with a few questions about the role of research in EdTech decision-making and whether the IHE conducted any of its own investigations into how well an EdTech product works. The interviews ranged in length from 31 to 172 minutes, averaging 66 minutes.

Eight members of Working Group B who were certified in human subjects research conducted the interviews, six members conducted between 1 and 5 interviews each, one member conducted 16 interviews, and one member conducted 17 interviews. Two thirds of the interviews were conducted by phone, 15% using Zoom, 13% were in person, and two were conducted using Skype or a combination of phone and Skype. The majority of the interviews were recorded (with the interviewees' permission) and the audio tapes were professionally transcribed before being checked for errors and coded in NVivo software. We used a combination of deductive and inductive theming and coding techniques (Merriam & Tisdell, 2015), first using questions in the protocol to "bucket" the data and subsequently searching for themes within each set of responses. Iteratively more granular theming and coding was facilitated by Excel and SPSS.

Excerpts from transcripts that were to be used in this report or other dissemination activities were emailed to the interviewees for optional review. Of the fifty individuals who were sent such excerpts, 36% requested one or more edits such as removing product or vendor names, formalizing conversational language, clarifying unclear text, and correcting grammar or words that were misunderstood or misspoken.

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Appendix 2: List of Interviewees

Interviewees are listed alphabetically by first name, according to explicit directions on their Informed Consents.

- Adrian Sannier, Chief Academic Technology Officer, Arizona State University
- Ami Bhandari, SVP of Education and Strategy, Lincoln Educational Services
- Andrew Shean, Chief Academic Learning Officer, Bridgepoint Education
- Annemarie Eades, Vice President for Information Technology Services/ CIO, University of West Georgia
- Anonymous
- Anonymous
- Associate Professor Kris Ryan, Academic Director, Monash University
- AZ Bashet, Dean of eLearning, Eastfield College
- Betty Vandenbosch, President, Kaplan University
- Chris Edwards, Assistant Vice President for eLearning, University of Cincinnati
- CIO at a small liberal arts college
- Dennis Bonilla, Executive Dean, University of Phoenix
- Donald Spicer, Assoc. Vice Chancellor and CIO, University System of Maryland
- Donny Gruendler, President, Musicians Institute
- Dr. Chris Freeman, VP IT Solutions, Education Corporation of America
- Dr. Preston Davis, Director of Instructional Services, Northern Virginia Community College
- Greg Karzhevsky, Chancellor, Jersey College
- James A. Bologa, President and CEO, Porter and Chester Institute/ YTI Career Institute
- Jennifer Sparrow, Senior Director for Teaching and Learning with Technology, Penn State
- John Kolb, Vice President for Information Services and Technology and CIO, RPI
- Jonathan Becker, Director, Learning Innovation and Online Academic Programs, Virginia Commonwealth University
- Joseph A. Moreau, Vice Chancellor of Technology, Foothill-De Anza Community College District
- Judith Giering, Director, Learning Design and Technology, University of Virginia
- Karen Harpp, Professor of Geology and Peace and Conflict Studies, Colgate University
- Karen VenDouern-Srba, Vice President, Academic and Instructional Technology, American Public University System
- Kyle Bowen, Director ETS, Penn State
- Lee Wetherington, Dean of Administrative Services, Lenoir Community College
- Mark Berman, Associate VP and Chief Information Officer, Siena College
- Matthew Rascoff, Vice President of Technology-based Learning and Innovation, University of North Carolina (now Associate Vice Provost for Digital Education and Innovation, Duke University)
- Matthew T. Gardenghi, Senior Manager, IT Academic Technologies, Bob Jones University
- Melanie Kowalski, Director of Information Technology, Lackawanna College
- Michelle R. Weise, Chief Innovation Officer, Sandbox ColLABorative, SNHU
- Naveed Husain, Chief Information Officer, Teachers College, Columbia University
- Patricia James, (Immediate Past) Executive Director, Online Education Initiative, California Community Colleges

- Paul Foster, Director, eLearning Technology, University of Cincinnati
- President, Anonymous [institution]
- Prof. Phillip Long, Associate Vice Provost & Chief Innovation Officer, The University of Texas at Austin
- Randall Wells, Chief Academic Officer, Southwest Kingston University
- Robert Heinrich, Chief Information Officer, Stockton University
- Ron Hutchins, VP - IT, UVA
- Rusty Hunt, President, Lenoir Community College
- Ruth Veloria, Executive Dean, School of Business, University of Phoenix
- Ryan R. Hobbs, Director, eLearning, Salt Lake Community College
  (now Director, Distance & Digital Learning, Dixie State University)
- Sanjay Sarma, Vice President, Open Education, MIT
- Scott Shaw, CEO and President, Lincoln Educational Services (Lincoln College of Technology-Grand Prairie)
- Senior Administrator, For-profit university
- Shawn Miller, Director - Center for Instructional Technology, Duke University
- Steve Rossiter, Director - IT Support, Delta Career Education
- Steven Goss, Vice Provost, Digital Learning, Teachers College, Columbia University
- Thomas Cavanagh, Associate Vice President, Distributed Learning, University of Central Florida
- Tina Meagher, Senior Video Strategist, University of Cincinnati
- Tina Parscal, Executive Director, Colorado Community Colleges Online

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Appendix 3: Interview Questions

EdTech Decision-Making in Higher Education

1. What are your major sources of information on educational technology products and trends?

2. Who do you consider to be an opinion leader, change maker, or innovation leader for educational technology? (Can be individuals, organizations, other institutions, or other definitions of a leader in educational technology).

3. Who at your institution participates in decisions about acquiring educational technology (EdTech) for the purposes of facilitating or supporting teaching and learning?

4. Can you describe a recent EdTech-related decision (for EdTech to facilitate or support teaching and learning) that you participated in for your institution and the goal you were trying to address? (e.g., adoption of a Learning Management System).

5. How was the need for this technology identified? Who (what person, group) identified this need?

6. How was this particular decision made:
    a. Who were the stakeholders in this decision, i.e., who were the groups of people who would be affected by the decision at your institution? (students, faculty, administrators etc.)
    b. Who decided which stakeholders to consult?
    c. How was stakeholder input obtained?
    d. Who actually participated in making the decision?
    e. How was the universe of potential EdTech options identified and by whom?
    f. Who was consulted externally or internally for information about alternatives?
    g. Did you issue a formal RFP for this acquisition? If yes, are you able to share that with me?
    h. What specific information was obtained to help with decision-making and from where was it obtained? What information did you request from the vendor / what information did the vendor supply you?

7. What factors were considered or what criteria were applied to make the decision?

8. Can you score the importance of each criterion out of 100? [If all items are equally important, they can each be scored 100].

9. How did you assess each EdTech option against each of the criteria you noted above?

10. a) How were stakeholder input and your various assessments about each EdTech option used in making the final decision?
    b). Who made the final decision?

11. *If "efficacy research" or "research" come up as criteria*
    a. What counts as "research" in your opinion?
    b. What specifically does "efficacy research" mean to you?

c. What are some specific examples of research that you used to help with the EdTech decision you gave as an example?
d. What research would be helpful for your EdTech decision-making if it were available?
e. More generally, what are your sources for any research that you use for EdTech decision-making, and can you think of any specific examples that are particularly helpful?

12. If efficacy research or research more generally has <u>not</u> arisen as one of the criteria in decision-making:
a. When making decisions about EdTech acquisition/use, does your institution ever seek out research on how well an EdTech product or strategy works to facilitate or support teaching and learning?
b. If no, why not? What research would be helpful for your EdTech decision-making if it were available?
c. What counts as "research" in your opinion?
d. What specifically does "efficacy research" mean to you?
e. If yes, what are some specific examples of research that you have used to help with EdTech decision-making?
f. What are your sources for any research that you use for EdTech decision-making?

13. Does your institution ever conduct its own investigations/research into how well EdTech products currently being used work, and/or do you have plans to do so? (Yes/ No)
a. If yes, for which EdTech products have you conducted such investigations/research, or for which EdTech products do you have plans to do so?
b. Please describe one or more of these examples in detail. Can you share any written materials on the process and findings of such investigations/studies?
c. If no, what are the reasons?
d. More generally, what kinds of internal or external research would be useful to inform your EdTech decision-making if it were available?

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Appendix 4: Sources of EdTech Information

Associations and Consortia Named as a Source of Information on EdTech Products and Trends

Association/ Consortium	No. of interviews in which association/consortium was mentioned
American Association of Community Colleges (AACC)	1
American Educational Research Association (AERA)	2
American Evaluation Association (AEA)	1
American Society for Engineering Education (ASEE)	1
Association of American Universities (AAU)	1
Association for Computing Machinery (ACM)	1
Association for Educational Communication and Technology (AECT)	1
Association for the Advancement of Computing in Education (AACE)	1
Association of Research Libraries (ARL)	1
ASU GSV	1
Bay View Alliance	1
California Community College Chief Information Systems Officers Association (CISOA)	1
Capital Area Higher Ed IT	1
Chicago Online EdTech Consortium	1
Coalition for Networked Information (CNI)	1
College and University Professional Association for Human Resources (CUPA-HR)	1
Consortium of College and University Media Centers (CCUMC)	1
Consortium of Liberal Arts Colleges (CLAC)	2
EDUCAUSE	22
EDUCAUSE Learning Initiative (ELI)	3
Five College Consortium	1
IEEE Computer Society	1
IMS Global Learning Consortium	3
International Society for Technology in Education (ISTE)	1
Ivy Plus Groups	1
Ivy Plus Groups (Directors of Academic Computing)	1
Learning Technology Consortium	1
Massachusetts State University and Community College CIO Council	1
New Media Consortium (NMC)	2
New York Six Liberal Arts Consortium	1

NJEdge	1
North Carolina Community College Chief Information Officer Association	1
Northeast Liberal Arts Colleges (NELAC)	1
NorthEast Regional Computing Program (NERCOMP)	2
Online Learning Consortium (OLC)	6
Society for Information Technology and Teacher Education (SITE)	1
The Liberal Arts Consortium for Online Learning (LACOL)	1
The President's Forum (Collaborative for Quality in Alternative Learning (CQAL) E-Learning Caucus)	1
University Innovation Alliance	1
United States Distance Learning Association (USDLA)	1
WICHE Cooperative for Educational Technologies (WCET)	3

Network Events Named as a Source of Information for EdTech Products and Trends

Network events	No. of interviews in which event was mentioned
Accrediting Council for Independent Colleges and Schools (ACICS) Annual Meetings	1
American Association of Community Colleges (AACC) Conference	1
American Educational Research Association (AERA) Annual Meetings	1
American Evaluation Association (AEA) Conferences	1
American Geophysical Union Conference	1
Asilomar II: Student Data and Records in the Digital Era (Hosted by Stanford and Ithaka S+R)	1
American Council on the Teaching of Foreign Languages (ACTFL) Conference	1
Association for the Advancement of Computing in Education (AACE) Conferences	1
ASU GSV Summit	8
Australasian Society for Computers in Learning in Tertiary Education (Ascilite) Conference	1
California Community College Chief Information Systems Officers Association (CISOA) Conferences	2
Campus Management Conference	1
Campus Technology Forum	1
Capital Area Higher Ed IT Conferences	1
Capital Roundtable Conferences	1
Career Education Colleges and Universities (CECU) Conferences and Trade Shows	2
Center for Research on Learning and Teaching (University of Michigan) National Conferences	1
Cisco Live	1
Coalition for Networked Information (CNI) Meeting	1
Consortium of College and University Media Centers (CCUMC) Conference	1
Consumer Electronics Show (CES)	1
Coursera Conferences	1
DevLearn Conference and Expo	2
Distance Education Accrediting Commission (DEAC) Annual Meetings	1
Dreamforce (Salesforce) Conference	2
EDUCAUSE Center for Analysis and Research (ECAR) Events	1
EDUCAUSE Conferences	24
edX Conferences	1
EDUCAUSE Learning Initiative (ELI) Conferences	4
Elliott Masie Conference	2

Ellucian Live	1
Elon University Teaching and Learning Conferences	1
Gartner Events (including CIO events, the Gartner Symposium, and Gartner Trade Shows)	4
Geological Society of America Annual Meetings	1
IBM Cognitive Computing Colloquium	1
IMS Global Learning Consortium Events	1
InfoComm	2
Innovate (The Ohio State University Regional Conference)	1
Innovations Conference (The League for Innovation in the Community College)	1
InstructureCon	2
International Society for Technology in Education (ISTE) Conference and Expo	1
Internet2 Global Summit	2
Ivy Plus Events (including the Online Learning Group and Directors of Academic Computing)	4
JEN (Jazz Education Network) Events	1
Jenzabar Annual Meeting (JAM)	1
Learning Technology Consortium Bi-annual Meeting	1
Learning with MOOCs II (Columbia University)	1
LearnLaunch Institute (MIT) Conferences	1
Lilly Conference Series on College and University Teaching and Learning	1
Long Island Council of Student Personnel Administrators (LICSPA)	1
Microsoft Education's Strategic Advisory Committee Meetings	1
National Association of Music Merchants (NAMM) Show	1
National League of Nursing (NLN) Education Summit	1
New Media Consortium Conferences	3
New York EdTech Week	1
New York State Education and Research Network (NYSERNet) CIO Conference	1
NJEdge Annual Conference	1
North Carolina Local Government Information Systems Association (NCLGISA) Conference through UNC Chapel Hill	1
Northeast Regional Computing Program (NERCOMP) Events	2
Ohio Higher Education Computing Council (OHECC) Conference	1
Online Learning Conference	1
Online Learning Consortium (OLC) Events	7
Online Teaching Conference	1
Open Education Conference	2
Oracle's Strategic Advisory Committee Meetings	1
Percussive Art Society International Conventions (PASIC)	1
Professional and Organizational Development (POD) Network Conference	2

Sakai Conferences (by Open Apereo)	1
Society for Information Management (SIM) Regional Conferences	1
South by Southwest (SXSWedu)	3
South Carolina EdTech Conference	1
The Consortium of Liberal Arts Colleges (CLAC) Events	2
The Higher Learning Commission (HLC) Annual Conference	1
Utah Technology Teaching Council (Utah Education Network) meetings	1
WCET (WICHE Cooperative for Educational Technologies) Annual Meeting and Summer Summit	1
General Mentions of Network Events (no specific event mentioned)	27

Publications Named as a Source of Information on EdTech Products and Trends

Publications	No. of interviews in which the publication was mentioned
White Papers/ Research Reports	
American Enterprise Institute (AEI) Reports	1
Brookings Institution Reports	1
EDUCAUSE Center for Analysis and Research (ECAR) Research and Analysis Reports	1
Eduventures Reports	1
Gartner Reports	6
Horizon Report (from New Media Consortium)	7
Lumina Foundation White Papers	1
National Institute for Learning Outcomes Assessment (NILOA) White Papers	1
NBER Working Paper Series	1
Trade Magazines	
Campus Technology	7
College Planning and Management	1
Community College Daily	1
Computerworld	1
EdTech Magazine	1
Magna Publications	1
Microsoft Press Publications	1
PRISM Magazine (American Society for Engineering Education (ASEE))	1
Redmond Magazine (Microsoft)	1
TechCrunch	1
University Business Magazine	8
Discipline-specific Trade Magazines	
ATM Magazine	1
Automotive or HVAC journals	1
Guitar Player Magazine	1
Mix Magazine	1
Modern Drummer Magazine	1
Peer-Reviewed Journals	
Journal of Professional Nursing	1
Journal of Geoscience Education	1

Journal of Learning Analytics	1
The International Review of Research in Open and Distributed Learning (IRRODL)	1

Partially or Non-Peer Reviewed Journals/ Papers

American Evaluation Association (AEA) journals* **	1
Communications of the ACM**	1
Community College Journal	1
EDUCAUSE (Review/ Publications)**	19
Psychological Science in the Public Interest**	1
Spectrum (Computer Society of IEEE)	1
United States Distance Learning Association (USDLA) Quarterly Journals	1

News/ Newsletters

AV Tech	1
EdSurge	3
EDUCAUSE Learning Initiative (ELI) Newsletters	2
Forbes	1
Inside Higher Ed	16
NPR Higher Ed	1
NY Times Education	2
POLITICO Pro	1
Reports from Bryan Alexander/ Michael Feldstein	1
The Chronicle of Higher Education	19
The Economist	1
The Hill	1

Research/ Publication Repositories

Academic Impressions Article Library	1
Association for the Advancement of Computing in Education (AACE) Digital Library	1
International Society for Technology in Education (ISTE) EdTek Hub	1
Jisc Learning and Research Resources	1
Professional and Organizational Development (POD) Network Publications Library	1

* includes 3 publications: American Journal of Evaluation, New Directions for Evaluation and Guiding Principles for Evaluators
** partially peer-reviewed

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Appendix 5: Opinion Leaders, Change Makers, and Innovation Leaders

Organizations Named as Opinion Leaders, Change Makers, and Innovation Leaders

All organizations were mentioned in one interview except for those listed in Table 10 which were mentioned more often.

IHEs

Arizona State University (ASU)
Carnegie Mellon University
Drexel University
Embry-Riddle Aeronautical University
Harvard University
Indiana University
Kaplan University Board of Trustees
Massachusetts Institute of Technology (MIT)
Michigan State University
Ohio State University
Penn State World Campus
Southern New Hampshire University (SNHU)
Stanford University
Teachers College, Columbia University
University of California
University of Colorado
University of Illinois at Urbana Champaign (UIUC)
University of Kentucky
University of Maryland University College (UMUC)
University of Michigan
University of Minnesota
University of Texas at Austin
Western Governors University

Professional Associations/ Consortia

Consortium for Georgia State
Consortium for Virginia and Virginia Commonwealth
EDUCAUSE
EDUCAUSE Learning Initiative (ELI)
International Society for Technology in Education (ISTE)
Internet2
Ivy Plus
New Jersey Education Association (NJEA)
New Media Consortium
Regional Collective Purchasing Groups (e.g., MiCTA)

WICHE Cooperative for Educational Technologies (WCET)
Western Governors Association

Vendors/ Businesses

2U
AltSchool
Amazon Kindle
Area9
ASU–Draper–GSV Accelerator
Coursera
D2L/ Brightspace
Entangled Solutions
Google
Hewlett-Packard
Hudson Music
Instructure/ Canvas
McGraw-Hill Education
Music Prodigy
NonLinear Educating/ AskVideo
Pearson Higher Education
Realizeit
Rethink Education
StraighterLine
Udacity

Foundations
Bill and Melinda Gates Foundation
Lumina Foundation

Research Organizations
Ithaka S+R
RAND Corporation
SRI International

Non-profits
Khan Academy
Minerva Schools
USA Funds (now Strada Education Network)

Other

Boston Consulting Group
Chronicle of Higher Education
INFOCOM (IEEE International Conference on Computer Communications)

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Individuals Named as Opinion Leaders, Change Makers, and Innovation Leaders

All individuals were mentioned in one interview except for those listed in Table 11 which were mentioned more often.

Current or Former IHE Personnel	**Affiliation**
Michael Crow	Arizona State University
Dale Johnson	Arizona State University
Jeff Selingo	Arizona State University
Ruvi Wijesuriya	Arizona State University
Lou Pugliese	Arizona State University (Ed Plus Action Lab)
Matthew Reed	Brookdale Community College
Michelle Brock	California State University Channel Islands
Kyle Johnson	Chaminade University
Connie Johnson	Colorado Technical University
Peter Lepage	Cornell University
Kristen Eshelman	Davidson College
Robert Gagné	Florida State University*
Joseph A. Moreau	Foothill-De Anza Community College District
Randall Bass	Georgetown and Designing the Future Initiative
Clayton Christensen	Harvard Business School
Chris Dede	Harvard University
Hunt Lambert	Harvard University
Eric Mazur	Harvard University
Kevin McDonough	Lackawanna College
Seymour Papert	MIT Media Lab*
Alex (Sandy) Pentland	MIT Media Lab
J. Philipp Schmidt	MIT Media Lab
Jeff Merriman	MIT Office of Digital Learning
Celeste Schwartz	Montgomery County Community College
Micah Orloff	Mt. San Jacinto College
Anna Stirling	Mt. San Jacinto College and @One Project
Fred Estrella	Northern Arizona University*
Clay Shirky	NYU and New Media ITP
Kristen Sosulski	NYU Stern School of Business
Robert Ubell	NYU Tandon School of Engineering
Kyle Bowen	Penn State University
Michele Norin	Rutgers University
James Frazee	San Diego State University
Paul LeBlanc	Southern New Hampshire University
Candace Thille	Stanford University
Peter Shea	SUNY Albany
Lisa Stephens	SUNY Office of the Provost
Thomas Hatch	Teachers College, Columbia University

Fiona Hollands	Teachers College, Columbia University
Arthur Langer	Teachers College, Columbia University
Ellen Meier	Teachers College, Columbia University
Mimi Ito	University of California, Irvine
Vince Kellen	University of California, San Diego
Richard Mayer	University of California, Santa Barbara
Thomas Cavanagh	University of Central Florida
Jesse Stommel	University of Mary Washington/ Hybrid Pedagogy
Cristi Ford	University of Maryland University College (UMUC)
Joellen Shendy	University of Maryland University College (UMUC)
Jack Suess	University of Maryland, Baltimore County
Stephanie Teasley	University of Michigan LED Lab
James Tilton	University of Michigan
Matthew Rascoff	University of North Carolina (now at Duke)
Gerald Knezek	University of North Texas
Lin Lin	University of North Texas
J. Michael Spector	University of North Texas
Dave Cormier	University of Prince Edward Island
Eric Fredericksen	University of Rochester/ OLC
Richard Seymour	University of Sydney
George Siemens	University of Texas at Arlington LINK Lab
MJ Bishop	University System of Maryland
David Merrill	Utah State University
Gardner Campbell	Virginia Commonwealth University
Michael Caulfield	Washington State University Vancouver
Fred Hurst	Western Governors University

Business/ Organizational Leaders

John Whitmer	Blackboard
Andrew Smith Lewis	Cerego LLC
Jim Thompson	CogBooks Ltd
Daphne Koller	Coursera/ Stanford
Joel Hernandez	eLumen, Inc
Paul Freedman	Entangled Ventures
Jaime Casap	Google
Deborah Quazzo	GSV Advisors/ Acceleration
Michael Moe	GSV Capital
Audrey Watters	Hack Education
Rob Wallis	Hudson Music
Bror Saxberg	Kaplan, Inc.
Jose Ferreira	Knewton*
David Wiley	Lumen Learning
Stephen Laster	McGraw-Hill Education
David Levin	McGraw-Hill Education
Howard Moskowitz	Mind Genomics Advisors LLC
Martin Sitter	Non-Linear Educating Inc

Matt Leavy	Pearson eCollege
Burck Smith	StraighterLine
Ryan Craig	University Ventures

Consultants

Bryan Alexander	Bryan Alexander Consulting, LLC
Alan Levine	CodDogBlog and Freelance consultant
Michael Feldstein	MindWires Consulting/ e-Literate
Phil Hill	MindWires Consulting/ e-Literate

Researchers/ Think Tank Personnel

Michael Horn	Clayton Christensen Institute
Jan-Martin Lowendahl	Gartner
Kevin Guthrie	Ithaka S+R
Catharine Bond Hill	Ithaka S+R
Elliott Masie	MASIE Center
Stephen Downes	National Research Council

Foundation Leaders

Rahim Rajan	Bill and Melinda Gates Foundation
Daniel Greenstein	Bill and Melinda Gates Foundation

Other

John Spencer	Creative Classroom
Malcolm Brown	EDUCAUSE Learning Initiative (ELI)
Anant Agarwal	edX
Rebecca Frazee	FLEXspace Project
Salman Khan	Khan Academy
Russ Poulin	WCET
Niki Bray	WCET (now at University of Memphis)
Malcolm Gladwell	Writer and journalist (on staff at the New Yorker)

* former affiliation

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Appendix 6: Categorizing Decision Criteria and Weighting

Of the 45 interviews following the regular interview protocol, 43 identified between 2 and 12 criteria, with a mode of 5 and a median of 6 criteria. One interviewee did not provide any criteria and in one case we were directed to the RFP for the decision being discussed which listed 209 criteria under 15 categories. For the purposes of our analysis, we used these 15 categories as the criteria for this IHE. Our analysis of criteria is therefore based on 44 of the interviews.

Once the interviewees had listed their criteria, they were asked to weight each criterion independently out of 100 (not totaling 100). Of the 44 cases in which criteria were provided, such weights were assigned to some or all of the criteria in 30 cases. In nine cases, the interviewees declined to assign any weights verbally (although in some cases they indicated that weights were assigned in the formal evaluation process); in two cases, the interviewees instead provided weights that totaled 100; in two cases, the interviewee ranked the criteria instead of weighting them; in another case, weights had been formally assigned but were not as yet publicly shareable; and, in one case, the interviewer did not ask for weights.

In total, 170 of the 277 criteria listed were assigned weights out of 100. If an interviewee provided a range for the importance weight of a criterion, we used the mid-point of the range, (i.e., if the weight assigned was 70-80, we used 75 as the weight). Weights shown in Table 12 are straightforward averages for each category.

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