Passing the Baton: Digital Literacy and Sustained Implementation of eLearning Technologies

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INTRODUCTION

Institutional efforts to increase educator buy-in for the adoption of eLearning technologies may enhance educator motivation to engage with innovative technologies outside the processes and protocols best equipped to support effective implementations. A two-year study of the barriers and affordances to the successful implementation of evidence-based instructional tools and strategies at scale makes clear that instructional autonomy, a reliance on peer networks, risk-averse instructional development, and unidentified pedagogical misalignments intersect such that educator buy-in often comes at the cost of digital literacy. Key information needed to effect successful implementation is therefore often missing but not missed in efforts to adopt eLearning technologies, leading educators to rapidly abandon implementation efforts.

Evidence-based eLearning tools have proliferated in recent decades, but adoption at scale remains elusive. Many tools and practices which have been proven effective are not widely used in instructional contexts due in part to the complexity of implementation (Folkestad & Haag, 2002; Gannon-Cook, Ley, Crawford & Warner, 2009; Parthasarathy & Smith, 2009; Reid, 2012; Scheines, Leinhardt, Smith & Cho, 2005; Spodark, 2003; Zemsky & Massy, 2004). Our limited understanding of the institutional and cultural factors embedded in implementation strategies and processes that hinder or promote the adoption of new instructional tools and practices remains a significant factor. The organizational and administrative landscape can be challenging to understand and more challenging to navigate. Competing goals further complicate administration and policymaking (Bowen, 2013). Efforts to implement specific technologies are often guided by the uncoordinated and unreported efforts of educators, administrators, researchers, and commercial enterprises. While published research on educational technologies, including frameworks and protocols are available (Howlin & Lynch, 2014; Kirkpatrick, 1989; Twigg, 2003, 2012), many efforts instead attempt to innovate an approach to implementation. These bodies of literature, protocols, and services include point identification of potential barriers, tailored approaches based on collected wisdom and metrics of educator

engagement and performance. Course or curricular transformation efforts in postsecondary contexts necessarily engage a large number of people, including administrators, educators, and support staff. Success often relies upon the efforts of educators who are not sufficiently prepared and/or not sufficiently motivated to use eLearning technologies (Hagood, M. Provost, Skinner, & Egelson, 2008).

The need for both preparation and buy-in has been detailed in research on the barriers, affordances, and strategies for integration of these educational tools and strategies (Ashok, 2014; Gannon-Cook, et al., 2009; Murray & Pérez, 2014; Parthasarathy & Smith, 2009; Reid, 2014; Weiman, 2007) and on the extension and optimization of educator and institutional support (Ambrose, Bridges, DiPietro, Lovett & Norman, 2010; Beach, Sorcinelli, Austin, & Rivard, 2016; Orr, Williams & Pennington, 2009; Wieman, 2017). To prepare and motivate educators, institutions rely on a suite of approaches, including peer discussion, learning communities, and other educator network engagement (Beach et al., 2016). Educator buy-in is crucial for successful implementation of eLearning tools (Lammers, Bryant, Sarkisian Michel & Seaman, 2017), and lack of educator buy-in is often attributed to a lack of support for educators (Lederman, 2017).

A recent research effort, funded by the Carnegie Corporation (Herckis, 2018), was undertaken to identify barriers and affordances to the adoption and sustained use of technology-enhanced learning tools. This project went beyond "faculty resistance" and "lack of faculty support" to explore personal values, attitudes, perceptions, and behaviors around the implementation of eLearning technologies; rationales for decisions made; and the nature of sustained engagement with (or abandonment of) efforts to integrate new eLearning technologies into practice. Findings confirm recent exhortations to increase educator buy-in, and reaffirm the efficacy of common methods for achieving higher levels of educator buy-in. However, supposedly proven modes for increasing engagement and motivation around eLearning tool adoption simultaneously positions educators for failure. This is because the confluence of instructional autonomy, a reliance on peer networks, risk-averse instructional development, and unidentified pedagogical misalignments mask necessary specialized knowledge and minimize the need for supportive resources, leaving educators most likely to adopt new tools also most vulnerable to forging ahead without sufficient preparation.

METHODS

An anthropologically grounded research effort was initiated in the summer of 2015 and undertaken over the course of the ensuing two years. A parallel-convergent study design incorporated ethnographic methods, material analyses, a survey of faculty, and a series of semi-structured interviews over two phases of study. Ethnographic methods allow the researcher to paint a realistic and detailed

picture of the landscape of goals, motivations, and expectations in which innovative teaching tools and practices are effectively adopted, as well as some of the challenges which projects might face. This work began with several months spent building rapport, becoming familiar with the relevant administrative, policy, and cultural contexts, and conducting unstructured interviews with informants. At the end of this initial period, a fixed multi-phase mixed-methods research design was conceived and initiated, entailing in-depth ethnographic observation of four projects with stated goals for developing and deploying technology enhanced tools for teaching. These efforts were variously described as course transformation, innovation, design, and development efforts. Subject selection was based on (1) inclusion in a grant narrative submitted to the Carnegie Corporation for funding this project; (2) scope of project (3) nature of collaboration; and (4) convenience.

Mixed-methods research has its roots in social and human sciences and has been widely employed across a variety of disciplines and in interdisciplinary research for several decades (Creswell & Clark, 2011). The integration of data collected through the complementary use of various qualitative and quantitative methods provides an opportunity for the development of agile research designs which (1) capture information with substantial breadth and granularity and (2) are responsive to a changing landscape. Nastasi and Hitchcock (2009) argue that mixed-methods research is the only way to explain outcome variations within and across layers of multilevel interventions and across contexts. Mixed-methods research can be used to answer questions or validate findings in contexts where qualitative or quantitative methods alone are insufficient, lacking in statistical power, or limited in scope (Palinkas & Soydan, 2012). Mixed-methods research offers a suite of ways to conceptualize, plan, collect, analyze, integrate, and interpret data (Creswell & Clark, 2011). Mixed-methods approaches are well-suited to take advantage of available rich sources of data relevant in the analysis of eLearning technology integration in higher education.

For the first two months of the study period, orientation and acclimation included interviews with key informants and observation of space, place, and activity across the campus of a research university (fig. 1). Twelve months of intensive ethnographic observation, along with material and spatial analysis, participant observation, digital ethnographies, and unstructured interviews, produced data concerning faculty culture, technological ecosystem, policy environment, and administrative behavior. Four initiatives to develop, instantiate, and use eLearning technologies served as central case studies over fourteen months of data collection. During this phase of research, a quantitative survey was deployed to full-time faculty who had taught at least one course on campus during the previous semester. A ten-minute survey instrument deployed to 1229

individuals in February and March 2016. Prospective participants were identified as teaching, research, and tenure-stream faculty with teaching appointments during the Fall of 2015. A total of 237 individuals responded. Results suggestive of various models allowed the researcher to focus on generalizable relationships and factors in continued ethnographic investigation, as well as returning information which could be leveraged in a later phase of investigation.

Figure 1. Herckis Timeline of Project Methodology and Initiative Duration
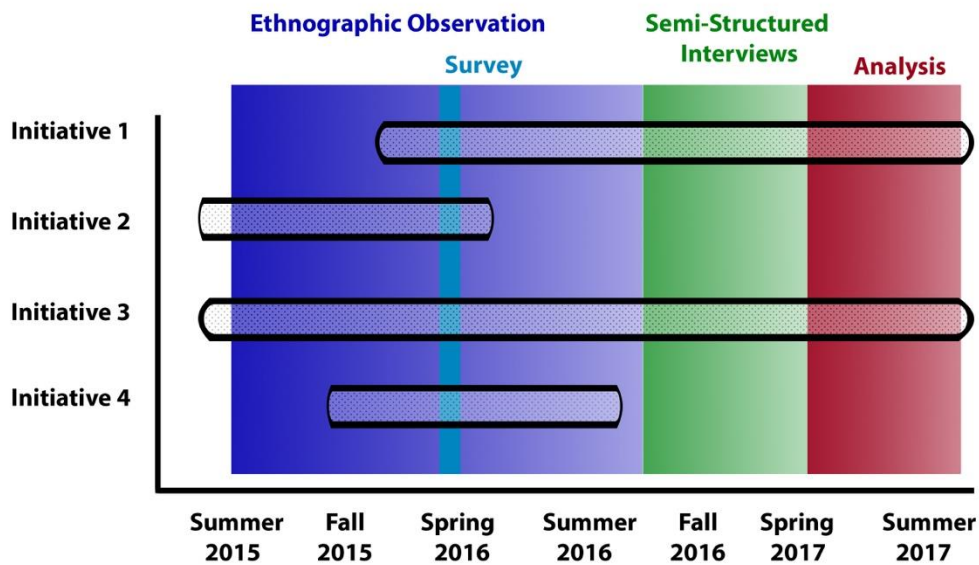
Survey results included information regarding recent behavior in innovating, co-developing, customizing, adopting, and continued use of eLearning technologies, as well as motivating factors for faculty in the context of engagement with innovation and the adoption of educational technologies. A large proportion of these factors may not be explicitly identified or understood as motivating factors by faculty, and some are challenging to disentangle from important confounds including professional aspirations, specific colleagues or courses, and political landscape. These represent important, unexplored factors in

faculty decision-making, but due to their special nature they are challenging to explore ethnographically. Four such factors were selected as potentially powerful motivators and included in a fractional factorial component of the survey. Factors selected for exploration in this way included collaboration with a colleague, duration of the project, value added, and originality, each of which was a statistically significant factor in faculty decision-making. Each of these factors was analyzed for statistically meaningful relationships with faculty behavior, especially the incorporation or innovation of eLearning technologies into their teaching practice. Exploration of the reasons and moments when educators decide to—or decide not to—incorporate new practices and technologies into their teaching practice returned data which could then be examined in the context of ethnographic and semi-structured interview data to paint a comprehensive landscape of the cultural, policy, and other key factors which shaped faculty buy-in regarding the adoption of eLearning technologies into their courses. Integrated analysis of ethnographic and survey data informed the development of an instrument used to collect semi-structured interviews in a second phase of research. Semi-structured interviews enabled the researchers to delve deeply into the intersection of decision making, policy, and identity around the use of eLearning technologies at the institution.

RESULTS

Study results indicate that educators perceive the adoption of eLearning tools into their established practice of teaching as risky, both for themselves and for their students. When exploring the ramifications of adopting new educational technologies, our data show that faculty rely heavily on prior experience, philosophies of teaching, and personal networks. By nature, course- and curricular transformations rely on the coordinated efforts of many distinct actors with different bodies of expertise. Effective communication among these many individuals presents a challenge which is often unrecognized by the collaborators themselves, resulting in miscommunication or lack of communication which itself goes unrecognized and is therefore not effectively addressed. Prioritization of independent problem solving, paired with the tendency to leverage informal support networks, means that would-be adopters and their support networks lack crucial digital literacy.

AUTONOMY AND ACADEMIC FREEDOM

The freedom of educators to make pedagogical choices for the classes that they are teaching is highly valued by study participants, who tie this autonomy to the idea of academic freedom. Educators who make choices independently about course transformations have special insight into the particulars of the course at hand but lack expert knowledge in other relevant areas: pedagogy, educational technology, and learning engineering among them. Educators who are (or who

feel) short on time look for rapid solutions to recognized challenges and turn to known and accessible resources: personal relationships and familiar tools, first and foremost. Use of technologies, especially technologies created by unfamiliar others—individual colleagues who are not friends or widely recognized colleagues, commercial entities without accessible documentation, etc.—are unknown quantities. Many educators express concerns about these unknowns, especially about access and continuity. In the context of this research, they expressed concerns about associated fees and the predictability of increases in cost in the future. They asked, "Is free support available in case I need it?" Will the current level of quality, support, or affordability change in the future? "If I leave the institution to take another job, will the materials I've developed here need to be left behind? Will all of the work I've put into developing my courses be lost?" These concerns intersect in complex ways as faculty consider their own efficient use of resources, their hesitancy to rely on apparently stable technology, support, and structures from year to year, and their responsibilities to students. Engaging with eLearning technologies of someone else's design requires a willingness to yield some autonomy to an external source. One professor relying heavily on a free educational tool said, "I'm sure the company is going to do something to make money in the not-too-distance future. And then one has to either come up with a replacement or put up with whatever nefarious scheme."

Educators were overwhelmingly concerned with ensuring that students had good educational experiences under their supervision and committed to ensuring that students were well-positioned to master disciplinary skills and knowledge. For each instructor, however, this meant something different. Teaching philosophies are deeply entangled with personal identity, formative individual experience, and teaching practice. While educators were universally committed to being "good professors," ideas about the role of teaching in this endeavor, or the nature of good teaching, varied widely (Herckis, 2018). Educators who teach the same courses repeatedly over their careers as faculty continually identify methods, tools, and approaches for these courses which they feel best serve their own instructional needs and the educational needs of students. To identify these methods, tools, and approaches, educators draw upon their own experiences, the recommendations of colleagues, and new resources that they are aware of. When something "works," or seems to, there is a strong incentive to maintain that approach; when something does not work, or stands improvement, there is a strong incentive to maintain all of the ancillary characteristics of the educational experience and focus surgically on targeted improvement. Minor modifications of existing pedagogies, changes to the way that eLearning technologies are used, and other small moves are desirable because they enable educators to maintain effective components of their teaching practice while

affecting improvements which meet identified needs. Often, this means that faculty only make changes when they recognize a problem.

More than half of survey respondents who had taught the same course more than once in the past three years (N=113, or 55% of respondents) reported adopting a new eLearning technology in the previous three years. Most of these (N=105, or 95% of respondents who had adopted a new eLearning technology into an extant course) reported that the intervention represented an improvement. A third of these respondents (N=69, or 34%) indicated that they had created a technology, component, program, or module of their own design for use in the course, and more than a fifth (N=47, or 23%) indicated that they had used a technology, component, program, or module of someone else's design, adapted for their own purposes. Nearly as many (N=43, or 21%) reported using a technology, component, program, or module of someone else's design, off the shelf. The longer it had been since educators received their terminal degree, the less likely they were to experiment with changes to format or goals of assignments or to adopt educational technologies of someone else's design. With every year since degree, the odds of an educator adopting a new eLearning technology that someone else created decrease by 49%. As educators develop their instructional practice, they identify effective instructional strategies and are less likely to deviate from predictably viable tools and strategies.

The premium placed by educators on autonomy lead them to believe that they should be able to find solutions quickly and independently. When educators identify teaching challenges, they often respond by thinking through potential solutions on their own. Because educators believe that effective teaching requires ingenuity, innovation, and efficiency, challenges may be framed as opportunities to improve student experience or student learning and may be framed as rectifying ineffective teaching strategies. Regardless of the positive or negative framing, an educator juggles these many considerations, consciously or unconsciously, when she or he begins to think through putting an extant course online, incorporating a graphical depiction of a key concept as a way to help students understand the principle better, making lectures more interactive, replacing static descriptions with animated illustrations, finding software to facilitate group work, or any other teaching challenge, large or small.

As educators develop their teaching practice over the years, they become less and less likely to adopt out-of-the-box eLearning tools of others' designs into their teaching practice. They become more likely to make minor enhancements to existing teaching practice, or to develop their own solutions to recognized challenges in their courses. This mitigates risks and enhances the tailored nature of interventions, enabling educators to maximally maintain the pedagogies and resources they have identified as effective through personal and practical

experience. The technological ecosystem in which educators teach continuously evolves, however, as do the pedagogies and instructional tools which are recognized as effective. As a result, experienced educators are likely to have more refined pedagogies which are increasingly outdated.

RISKS OF INNOVATION, RISKS OF ADOPTION

A decision to incorporate new eLearning technology is a decision to take a risk. When an educator adopts a new educational practice or technology, she or he is entering into new territory. Even if the eLearning resource in question has been tested in laboratory and in natural classroom conditions, even if a trusted friend and colleague has used it and vouches for it, even if the technology has been used in the context of the same course of instruction with students from the same institution, the incorporation of new-to-the-instructor technology entails a learning curve and adaptations of the eLearning tool for a novel classroom context, which will require some unknown (and, to some extent, unknowable) amount of time to realize, with some unknown (and, to some extent, unknowable) degree of uncertainty of the effect of incorporation. The implementation of new technology implies immediate risks—for example, it might fail to work as anticipated—as well as risks of downstream effects. Even a one-time-use intervention can have cascading effects on other aspects of a course: differences in mastery of skills which rest on earlier mastery of knowledge or skills introduced or practiced with eLearning tools earlier in the semester; student frustration with one class meeting or module translating into student disengagement later in the course; etc. These risks include many disasters educators imagine and fear: one professor said, "You're going to have to know how to use this system well enough that you're not an embarrassment to yourself, in front of your students". Additionally, some challenges can't be anticipated in advance. In development communities, it's widely acknowledged that it takes a couple of tries to perfect the implementation of an eLearning tool in a new educational context; "it" never works perfectly the first time. One professor interviewed for this research said, "To just get the technological tools, the computer programs running smoothly and without bugs, this is not trivial... You can't do this in one fell swoop." When educators are aware of this fact, they recognize adoption as entailing a risk of lost time and educational opportunity for students.

INFORMAL NETWORKS AND PERSONAL SUPPORT

Educators who are faced with a novel challenge—a challenge they have not faced before—nearly all reach out to friends and colleagues with whom they have worked closely, or to faculty who have taught the course at hand before. At the institution which served as the focus of this research, there are a multitude of resources available to faculty. These include experts who can advise on

technology, pedagogy, student needs, scholarship of teaching and learning, and more; resources for creating, improving, and sharing media; and more. Despite the availability of these resources, most faculty we spoke to consider these resources useful only when other courses of action were not available. Official campus resources were sometimes described as a failsafe: when nothing is working, perhaps an outside perspective will spark the needed creativity or suggest the kernel of a solution. In some cases, faculty described utilizing these resources as an indicator of incompetence: "if you have to call for help, you are clearly out of your depth." With so much to do, so little time, and this culturally engrained reluctance to leverage support, professors are hindered by their own relatively limited expertise and training. This barrier is exacerbated by two factors: First, the concern that seeking support reflects poorly on the professor is related to a tendency to leave such support out of conversations with other faculty, which perpetuates a perception of teaching as a solo effort. Second, such many professors are unaware of these resources, or aware of units but not aware of the kinds of support which can be accessed through them. This siloing means that a professor casting about for someone to ask may not know that there are experts at their disposal.

Educators reach out through personal networks more readily than through professional networks for support and look to commercial rather than institutional resources. In interviews, professors described receiving suggestions, advice, labor, and resources from friends, family, and colleagues. Capable and favored students—graduate and undergraduate—as well as junior collaborators were frequent sources of support. One professor described asking a "teenage daughter [who] was an aspiring filmmaker" to create digital lecture content to provide for students. Most educators were aware that services may exist on campus but were confident that an outside service provider would excel. One professor said, "[In terms of] production value, I would want to talk to somebody who has experience doing this sort of production. So I don't know about media services here, I've not dealt with them, but I will talk with them about what they could or would be willing to do. If I had access to a private company I would probably go with them."

When faculty do seek others' input, they often do so after assessing the broad context of the challenge and identifying a specific problem and accompanying solution. Often, these focused problems represent minor hurdles which, once cleared, allow the professor to continue executing the solution they have envisioned. For example, a professor who has decided to create a more active classroom, and who has heard of clickers from colleagues (or from targeted marketing) may decide to try clickers this semester for the first time. A quick online search may point to an apparently well-respected brand, leading the

professor to begin designing classroom implementation around their understanding (and assumptions) of this tool. When they struggle, the professor may identify a challenge such as "can I present results of polls to the class using Prezi instead of PowerPoint?" and a likely source of useful information as the company which makes the clickers. Calling customer support will allow the professor to determine whether, and how, to make this brand of clickers work with Prezi. This approach allows professors to go it alone but does not necessarily lead them to the efficient and effective solutions they seek. A holistic approach such as learning engineering is designed to leverage learning science research, cutting-edge technologies, and an integrated approach to designing effective pedagogies, presumes a blank-slate interest in building a learning experience from the ground up. Educators, however, never build a learning experience from the ground up: they always begin with ideas about teaching, learning, and disciplinary knowledge rooted in personal experiences, philosophies of teaching, and the various influences of their cultural, policy, and technological environment. A holistic approach might instead lead professors to infrastructure already in place (a particular brand of clickers already owned by students; a campus resource which obviates the need for integration of presentation software with clickers; a university-wide effort to leverage student-owned devices in lieu of additional technologies) or approaches which serve the same pedagogical end but obviate the need for such time-consuming problem-solving, such as the incorporation of think-pair-share exercises. Educators observed and interviewed for this study universally applied a challenge-centered approach. This approach was almost universally paired with an inclination to first seek input and support from informal and personal networks which rarely include experts in pedagogy or learning technology. As a result, faculty who are unaware of best practice solutions to classroom challenges virtually always remained unaware of best practice solutions as they undertook course transformation efforts.

Educators reaching out to colleagues and collaborators or finding their own motivation and information through other informal channels such as Web searches, tended to identify missing pieces of information and then go in search of that information. Sometimes that information was obtained quickly and easily; sometimes it proved elusive. Often, however, the information which educators sought was not the information that experts or collaborators identified as necessary. The person doing the work of adoption did not have critical literacy with some body of knowledge—the best practices associated with adoption of the eLearning technology in question, the technological infrastructure required for its use, the amount of labor required for setup, etc. In best case scenarios, this missing information was discovered in time to remedy a possible pitfall before having a negative impact on students and without taking a lot of time to resolve. In worst case scenarios, educators discover too late that they will not be able to

use the tool or technology as envisioned. This might take the form of a professor standing in front of a class troubleshooting an unfamiliar piece of equipment or abandoning it to improvise a new lesson plan. The impossible challenge of effectively thinking through all necessary preparation for an unfamiliar resource may not come as a surprise to technologists and faculty support personnel, who write resource guides and offer workshops and webinars on how to effectively implement new teaching tools. For a substantial proportion of the faculty population, however, tools which require workshops and webinars or other guidance to implement effectively are undesirable because of the perceived labor and risk involved, in addition to the perceived threat to autonomy in the classroom.

COLLABORATION AT A COST

Every project studied in the course of this research faced challenges when two or more people talked about accomplishing some goal, walked away from the conversation satisfied, and had different interpretations of the aims or content of the communication. Imperfect communication resulted in misaligned efforts, wasted energy, and frustration at best; at worst, it resulted in derailed efforts and negative perceptions of collaborators. In one case, a professor planned to modify and include an online module in his course content, at the request of a collaborator. The professor had done some work towards implementing the modified module and met with his collaborator and another colleague who was supporting the effort. After a conversation about progress, all three walked away with the impression that they were on the same page. Upon closer examination, however, the professor believed he had met and exceeded the expectations of his collaborators. His collaborator believed that the professor had taken the funding available to support the effort and misappropriated it. The supportive colleague wasn't sure what had gone wrong but was certain that this effort was not worth continuing. This miscommunication about goals and effort was not identified by any of the three participants and resulted in termination of the implementation effort.

In cases where misalignment is not noted, people believe that they understand shared goals but in fact have different understandings of their roles or of the "shared" goals. In these cases, outcomes are not as anticipated, and collaborators don't agree on (or don't discuss) where the effort went wrong. Sometimes, all collaborators remained content with the outcomes of interactions and resulting products of collaboration, but these interactions resulted in conflicting expectations or intentions. The most destructive miscommunications are in fact experienced by all participants as successful, comfortable communication: miscommunication is unnoticed and has persistent effects on the collaborative efforts. In the case of casual communication with colleagues,

family, and friends through informal networks, the need to communicate precise and specific information is lessened. When an educator is considering adoption of an educational technology and a colleague or friend who does happen to have relevant expert knowledge recognizes a knowledge gap, offering that information may be considered rude, uncouth, or unwelcome. When educators do not know exactly what guidance they need and ask colleagues who are experienced users but do not have expert knowledge about the technology, pedagogy, institutional support, or other key elements, these informal advisors may not recognize a need to share specific knowledge. While a conversation might feel helpful and complete to both parties, if critical information fails to transfer from the expert or experienced user to the potential adopter, it can result in misplaced confidence.

DISCUSSION

Preparation, including specialized digital literacy, is required to support educators in effectively adopting novel educational technologies (Mahiri, 2011; NCATE, 1997; Scheffler & Logan, 1999). However, providing this support is difficult in practice. Faculty support specialists may be aware that literature recommends they meet educators "where they are" in offering support (Ambrose et al, 2010; Bryk, Gomez, Grunow & LeMahieu, 2015; Gillespie, 2010). Unsolicited guidance from experts may be perceived as a threat to educator autonomy or academic freedom or seen as critical of educators' teaching skill or personal identity (Brownell & Tanner, 2012). Encouraging faculty to rely on peer networks may expose risk-averse faculty to new pedagogies and develop buy-in for transformative incorporation of eLearning tools because faculty are predisposed to reach out to peers through informal networks. This path to buy-in, however, increases awareness of the utility of eLearning tools without conveying the need for training and other preparation. As a result, it masks the need for specific knowledge which might ease initial adoption and improve early experiences with eLearning technologies.

Generalized faculty preparation in digital literacy, especially in the kinds of resources available at a given institution and the practical experience of intentional and effective adoption of eLearning technologies, may mitigate faculty reluctance to leverage institutional support structures and calibrate expectations of initial implementations. Specific tool and implementation-related knowledge related to eLearning tools may be available, but risk-averse faculty who are motivated to adopt tools because of engagement with personal and informal networks are likely to believe that they need no such preparation, and that they do not lack requisite digital literacy.

An adept champion who is motivated to move the project from one phase to the next can shepherd efforts successfully through these challenges. In these fraught transactions, a champion can mediate interactions and mitigate risks of

coordination, communication, and collaboration. Efforts which do not have the benefit of individuals or tools to facilitate collaborative progress were more likely to stall as a result. The presence of implementation models or detailed narrative descriptions are recommended to support rapid and effective integration of novel eLearning technologies.

In an effort to increase faculty buy-in, institutional efforts to promote informal discussion, faculty-driven exploration of eLearning technologies, and the use of personal networks may reinforce the perception that these can supply requisite information. The need for specialized knowledge goes unrecognized, faculty do not believe that they need preparation, faculty forge forward unprepared, and when implementations fail to meet expectations the bewildered educator blames the technology or the fit, not the lack of preparation or inadequate digital literacy.

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