Project Management Competencies of Educational Technology Professionals in Higher Education

A Qualitative Analysis of the Knowledge, Skills, and Abilities

James Kline, Swapna Kumar, & Albert D. Ritzhaupt

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The purpose of this research is to explore the competencies of project managers in the field of educational technology in the higher education context. A conceptual framework is presented based on the current definition of the field of educational technology; knowledge, skill, and ability (KSA) statements; and the sixth edition of the Project Management Body of Knowledge (PMBOK). Using this conceptual framework, an interview protocol with 11 open-ended questions was developed by the research team to gather relevant information from experienced educational technology project managers. We then interviewed N=13 educational technology project managers from institutions of higher education across the United States and analyzed these data using the Constant Comparative Method. Three dominant themes emerged during data analysis: "knowledge," "skills," and "abilities." These themes are described in detail along with the properties and categories from our data, and a discussion of our findings is provided. Recommendations are made for both researchers and professionals.

Introduction

What project management competencies (knowledge, skills, and abilities) must an effective educational technology professional possess to be successful in their role and responsibilities? Unfortunately, we do not have a clear and definitive answer to this important question from our current knowledge base. Project management as a field of endeavor has a rich history, a well-developed knowledge base (e.g., Project Management Body of Knowledge), a diverse set of practicing professionals across many disciplines (e.g., construction, information technology), and a strong professional credentialing system used to certify the active members of the profession (e.g., Project Management Professional certification). The field of educational technology utilizes knowledge, skills, tools, and techniques from

project management to assist in the creation of our products and services. Project management has long been recognized as a vital aspect to the individuals who practice the craft of educational technology (Donaldson et al., 2007; van Rooij, 2010; van Rooij, 2011). Though project management is deemed essential to the field of educational technology, scant research has documented the project management practices utilized by our professionals (Brill et al., 2006; Kang & Ritzhaupt, 2015; Ritzhaupt & Kumar, 2015). In each of the few empirical studies we do have, project management is recognized as a key competency for educational technology professionals (Brill et al., 2006; Kang & Ritzhaupt, 2015; Ritzhaupt & Kumar, 2015; Sugar et al., 2012). Yet we are still lacking a complete explanation of who, what, how, why, where, and when these project management competencies are employed by professionals within the field of educational technology, particularly in the higher education context.

While project management has been described as a generic methodology for managing most projects across disciplines (Pollack, 2007), the studies on educational technology project management have placed particular emphasis on the formalized standards contained within the Project Management Institute's (PMI) "Project Management Body of Knowledge" (PMBOK) (Brill et al., 2006; van Rooij, 2010). This collection of commonly accepted project management principles has become the de facto framework for managing projects, including educational technology projects in higher education. The PMI is the leading professional association in the United States governing the PMBOK and the Project Management Professional (PMP) certification, one of the most widely sought-after professional certifications (Starkweather & Stevenson, 2011). The PMBOK is a standardized body of literature approved by the American National Standards Institute (ANSI) (Cabanis-Brewin, 1999; Project Management Institute, 2017, p. 539) and underlies many project management training programs in the US. This document operationalizes and explains 10 knowledge areas (e.g., project cost management), five process groups (e.g., planning), and 49 individual processes (e.g., estimate costs) that cover the broad knowledge in the profession of project management. The PMBOK defines project management as the "application of knowledge, skills, tools, and techniques to project activities to meet the project requirements" (Project Management Institute [PMI], 2017, p. 10). The knowledge, skills, tools, and techniques are the resources that educational technology professionals draw from to complete their tasks in an effective and efficient manner.

Of particular importance for the current study is that the PMBOK is a descriptive project management framework that "identifies a subset of the project management body of knowledge that is generally recognized as good practice" (PMI, 2017, p. 2). The PMBOK is not a prescriptive methodology (e.g., PRojects IN Controlled Environments, or PRINCE2) or product development method (e.g., waterfall, agile) but claims to be "a foundation upon which organizations can build methodologies, policies, procedures, rules, tools and techniques, and lifecycle phases needed to practice project management." Likewise, the PMBOK asserts that "the knowledge and practices described are applicable to most projects most of the time, and there is consensus about their value and usefulness." The PMBOK assumes that practitioners will "tailor" (p. 28) the appropriate aspects of their project management frameworks to the needs of their particular industry or project. Project requirements are the criteria by which projects can be deemed a success or failure. These criteria are typically established early in a project life cycle and are uniquely tied to a specific project for a specific purpose. For instance, educational technology projects might have learning outcome requirements, accessibility requirements, or usability requirements that serve as these criteria.

The field of educational technology deploys nearly an endless list of possible products and services. These can range from technology enhanced learning environments, such as an immersive, educational game or simulation used in K-12 classrooms, to interactive and personalized online learning courses used in institutions of higher education, to performance improvement processes adopted in a Fortune 500 company. While the intellectual property and creations of these products are vastly diverse, they are all characterized as "project work" (Donaldson et al., 2007). These diverse projects are implemented by a wide range of professionals in the field of educational technology. We use the term "educational technology" to be inclusive of the many roles in our discipline, including titles like "instructional designer" (ID), "e-learning specialist," "instructional technologist," and more.

According to the PMBOK, a project is "a temporary endeavor undertaken to create a unique product, service, or result" (PMI, 2017, p. 4). The nature of the work in educational technology is such that we create unique products and services in a specified period of time. This work typically involves a team of stakeholders (e.g., subject-matter-expert, ID, graphic designer) working towards a common goal with limited time frames, budgets, and resources (van Rooij, 2010). Projects

are the basis for much of the work undertaken in the field of educational technology, which is why we draw so heavily from the field of project management.

Academic programs in the broad field of educational technology (inclusive of instructional design, instructional technology, learning design and technology, instructional systems, etc.) do not consistently offer academic courses in project management to prepare professionals entering the field (van Rooij, 2010; van Rooij, 2011). Therefore, many educational technology professionals may find themselves in the roles of managing projects or participating as a stakeholder on a project without any formal training on how project work is executed. While the nature of many projects in the field of educational technology might be considered small (e.g., designing and developing an online course) with fewer than 10 stakeholders, 6-month durations, and budgets less than $75,000 (van Rooij, 2010), some educational technology professionals might find themselves working in multi-million dollar initiatives without any preparation on how to function in these project-driven environments. A project is generally deemed successful if it is delivered on time, within budget, and meets the project requirements negotiated by the project sponsor(s) with an acceptable level of quality (PMI, 2017, p. 13).

Empirical research has documented that educational technology professionals spend a significant portion of their time on project management activities (Cox & Osguthorpe, 2003). While we know the fields of educational technology and project management work in tandem to meet the requirements of our work environments, none of the present studies explore the project management competencies of educational technology professionals using in-depth qualitative procedures to explore these phenomena. Since researchers from our field have questioned the preeminent value of the PMBOK to our profession (Brill et al., 2006), more empirical research is necessary to understand the actual aspects of project management that educational technology project managers in higher education are using in practice. We need a stronger understanding of how educational technology professionals are managing intricate projects in increasingly complex work environments with limited resources, evolving requirements, and multiple stakeholders.

Thus, the purpose of this research is to document the project management competencies (i.e., knowledge, skills, and abilities) utilized by professionals in the field of educational technology working in the higher education context using qualitative procedures to explore the deeper “who, what, how, why, where, and when” questions. Although qualitative research methods are rarely employed in project management research literature (Cicmil, 2006; Pollack, 2007), they can provide answers to exploratory research questions and assist with generating theory and hypotheses about a phenomenon. We explore the experiences of educational technology professionals that serve or have served in the role of project manager in higher education. This research sheds light on the educational technology field and provides useful knowledge to guide the practice of the professionals, professional associations, and academic programs in our field as we embrace the ideas from our sister discipline–project management. In order to do this, we explore a range of exploratory questions: How do educational technology professionals in higher education manage projects, and what competencies are necessary for them to succeed within this important role? In what ways does educational technology project management in higher education contexts reflect the standards of the PMBOK? Lastly, what other project management knowledge, skills and abilities are essential in our field?

Conceptual Framework

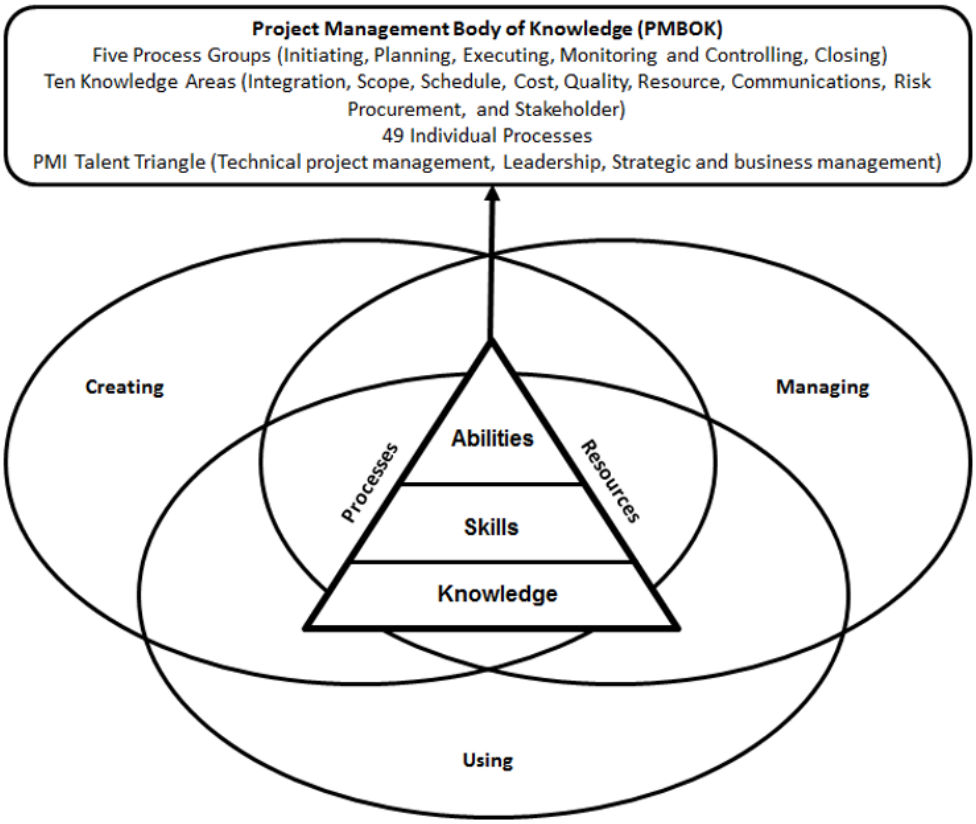
The conceptual framework proposed for this study is based upon research by Ritzhaupt, Martin, and Daniels (2010), Ritzhaupt and Martin (2014), and Kang and Ritzhaupt (2015). In these studies, the Association for Educational Communications and Technology (AECT) definition of educational technology (Januszewski & Molenda, 2007) was integrated with statements of knowledge, skill, and ability (KSA) (Ritzhaupt & Martin, 2014; Ritzhaupt et al., 2010). Specifically, the framework incorporates the AECT definition of educational technology with its three actionable concepts of “create, use, and manage” to explain the following statement: “Educational technology is the study and ethical practice of facilitating learning and improving performance by *creating*, *using*, and *managing* appropriate technological processes and resources” (Januszewski & Molenda, 2007, p. 1). The primary focus of this article is on the dimension of “managing” in the context of educational technology projects in higher education, specifically focusing on those aspects of managing that are employed in the practice of project management.

Figure 1 provides an illustration of the conceptual framework with each actionable concept as an intersecting circle creating a Venn diagram. The conceptual framework illustrates a triangle in the center to visually represent the interconnections between the actionable components of the AECT definition of educational technology as well as the processes and resources (i.e., tools and techniques used by project managers). Project management competencies are defined as KSAs mapped unto the PMBOK's five Process Groups, 10 Knowledge Areas, and 49 individual processes used in the formal project management standard (PMI, 2017). Additionally, we connected the KSAs to the "PMI Talent Triangle," which emphasizes competencies of project managers in three areas according to the newest edition of the PMBOK: "technical project management," "leadership," and "strategic and business management" (PMI, 2017, p. 56). These combined elements can be represented as KSA statements or competencies using this conceptual framework. As such, Ritzhaupt and Martin (2014) defines a knowledge statement as "an organized body of information" (p. 14) A skill statement is defined as the "manual, verbal, or mental manipulation of things" (Ritzhaupt & Martin, 2014, p. 2). Finally, an ability statement denotes "the capacity to perform an activity" (Ritzhaupt & Martin, 2014, p. 2).

As presented in Figure 1, KSAs merge and overlap within the three actionable concepts to represent the processes and resources employed by professionals in the field of educational technology with a focus on the actionable concept of "managing." These processes and resources are indicative of the 49 individual processes that account for the PMBOK, and the broader domains of competence outlined in the PMI Talent Triangle. The processes and resources are also representative of the tools employed in project management, such as common project management software packages (e.g., Microsoft Project). Ritzhaupt, Martin, and Daniels (2010) illustrated that the "knowledge, skill, and ability statements can be thought of as overlapping in which skills rest upon knowledge, and abilities rest upon skills" (p. 427). For example, the category, "[a]bility to create a risk management plan," requires related knowledge and skills to be able to fulfill the proposed ability statement. In particular, this ability might require knowledge of similar risks from previous projects of similar scope (e.g., expert judgement), stakeholder needs, and various analytical techniques for planning risk management as well as skills in decision-making, delegation, estimating, and budgeting.

Figure 1

Conceptual framework for educational technology project management in higher education. Adapted from "Development and validation of the educational technologist multimedia competency survey," by A. D. Ritzhaupt and F. Martin, 2014, Educational Technology Research and Development, 62(1), p. 13-33.



Method

Participants

The participants in this study were recruited from AECT's existing members in the spring of 2017. An e-mail request was sent which required potential participants to fill out a short pre-selection survey covering demographics, educational background, and professional experience. Given the nature of the study, participant selection for this qualitative study was intentionally purposeful with selection criteria established to identify participants who could best inform our research questions and enhance understanding (Creswell, 2009; Sargeant, 2012) of real project management competencies used in higher education. As such, the primary criteria for inclusion were that the professional worked in the field of educational technology within a higher education context, either had a job title of "project manager" or had professional experience serving in a project manager role regardless of formal title or institutional context, had worked in that capacity for at least one year, and was available for an online interview. We selected these criteria to ensure that the participants were experienced professionals in the higher education context using project management. Of 25 educational technology professionals who responded, 13 met the inclusion criteria based on their background, job title, and experience. These individuals were subsequently invited and agreed to participate in the study.

Of the 13 participants, eight were female and five were male. Their ages ranged from 27 to 65 years old, and their work experience ranged from three years to over 20 years. Ten of the participants held doctoral degrees, and the remaining three participants held master's degrees. All 13 participants worked in an educational technologically related role and either had a current title of project manager or previously held such a position. They all represented a diverse range of educational technology positions, including: two IDs, two senior IDs, two assistant professors, one associate professor, one full professor, four participants at a college director's level (Director eLearning and Instructional Technology; Director of Training; Director, Professional Development and Training; Director of Teaching and Learning Excellence), and an associate dean. Five of the participants worked at public universities, three worked at private universities, one

worked at a community/state college, one worked at a for-profit online university, one worked at a private, Christian liberal arts college, and two worked for independent instructional design service firms with major stakeholders in higher education. In total, eleven American states and one Asian country were represented.

In terms of project management experience, eight (the majority) participants managed project teams of one to five people; another four participants managed teams of six to 10 people; and one participant managed a team of 11 to 20 people. Only one participant reported having earned a formal project management certification. Of the thirteen participants, only one of the participants had a year or more of formal project management education or training; six had one project management course only; and another six had no formal project management training at all.

Survey and Interview Questions

The research team developed a semi-structured interview protocol of 11 open-ended questions intended to capture the essence of the specific project management KSAs that educational technology professionals who have served as project managers needed in order to manage complex projects. All questions were designed according to Patton's (1990) Interview Guide Approach to ensure uniformity and to facilitate an open dialogue with the participants without leading them toward a particular response. Of note, the questions were deliberately designed using simple language and not the technical jargon found in the PMBOK. This decision was made to ensure the interviewees fully understood the language and intent of each interview question in the event they did not have formal project management education or training. Each interview question was reviewed by two IDs in higher education following a standard think-aloud protocol (Ericsson & Simon, 1984; van Someren et al., 1994), and minor revisions in diction and sequencing of questions were made to the original items. Appendix A features the final version of the interview protocol.

Data Collection Procedures

All 13 interviews were conducted with each participant individually using the online web-conferencing software, Adobe Connect. All questions were presented orally (i.e., the voice of the interviewer) and in written form on the screen to assist participants in the virtual environment and to keep the interviewees focused on the topic being discussed. The same member of the research team conducted all 13 interviews to ensure consistency in the data collection process. Each interview was recorded using web-conferencing software for subsequent transcription and coding. The software generated individual video files with audio, which could then be used for data transcription. Each interview lasted from 45 to 60 minutes across all participants.

Data Analysis

Data were transcribed using a professional transcription service and then analyzed using the Constant Comparative Method (CCM), described by Glaser (1967) as that which is "concerned with generating and plausibly suggesting (but not provisionally testing) many categories, properties, and hypotheses about general problems" (Glaser, 1967, p. 104). The CCM was selected because it can be used to generate theoretical explanations of the phenomenon–project management competencies used by educational technology professionals–with a large corpus of qualitative interview data. In the CCM, incidents applicable to each category are first compared (Glaser, 1965; Glaser, 1967). Then, within each category (i.e., open-ended interview question), each incident (i.e., participant response) was coded. The category was then reviewed to compare and determine the codes across participants. Codes within each category were generated, and then codes across categories were compared and integrated into a set of themes; for instance, the codes "communication skills" or "empathy" occurred across multiple categories and were combined to form a larger theme.

We maintained a detailed audit trail during both the data collection and analyses processes to establish the dependability and confirmability of the findings. To increase trustworthiness, two members of the research team independently coded two categories and discussed their codes for differences. Following comprehensive discussion, all other categories were coded by one researcher, reviewed by a second researcher, and discussed by members of the research team before codes were collapsed across categories and finalized to create an initial taxonomy of codes. The

overarching themes “knowledge,” “skills,” and “abilities” were confirmed by looking within and across the taxonomy to discover relationships.

Results

As mentioned previously, three dominant themes emerged during data analysis: knowledge, skills, and abilities. Additionally, contextual information supporting these themes is provided in the following sections, including the project manager responsibilities and stakeholders, project management certifications, and project management technology resources. Additionally, we present our coding properties and categories in Appendix B

Responsibilities and Stakeholders

Common job responsibilities of the participants in higher education included managing both online and blended course design, development and improvement efforts for courses, training and professional development, faculty and user support, student support, staff support, training and technical support, or maintenance initiatives. In order to provide context and insight into their work environments, participants were asked about the primary stakeholders that they served as well as those that they viewed as most critical to their projects. Since all of these participants represented the higher education context, eight of them cited faculty members as being their critical stakeholders, and five others stated that their funding sources were the most critical stakeholders. Provosts and supervising partners were also mentioned as critical stakeholders in projects. In terms of primary stakeholders, participants mentioned the organization, learners, end-users, university administration, executive boards, program directors, and design departments.

Project Management Certification

While most of the participants recognized the extensive knowledge gained through formal project management certification, responses were largely mixed in their support for formal certification as a means of acquiring a ready skillset for managing real projects in the field. Instead, participants emphasized that the educational technology project manager should know the needs of the organization and client when opting for or against certification. One participant highlighted project management skills over project management certification, stating that “[c]ertification *might* [emphasis added] help you get clients. It's like if you're a small person consulting sort of job, but whether you have that or not, the schedule would be critical because you're not going to have that ability to bring in departments on time and on budget.” Another reflected:

> *So, I don’t have one, so I can’t say that there’s an advantage to it [emphasis added], but had I not had the two (project management) classes I took, I think I would be behind the eight ball. [For instance,] I don’t think that I ever would have understood that this is an 80-hour project, not an eight-hour project . . . And we know in the tech world nothing is perfect, and nothing works the first time through. So, in the absence of taking a class, I can see why a certificate would be beneficial, in giving you that background knowledge [emphasis added].*

Still other participants were entirely against the idea of getting formal project management certification as an essential requirement for managing educational technology projects in higher education. One participant taking this position stated:

> *Not PMP. They're still too wedded to linear models that really end up being games between project managers and the people who do the real work. I’ve never met an engineer who knows what’s going to happen more than two weeks or three at the most anyway. So I know PMP is popular. I know that certificate commands a pay grade. So there is a value to it. I don’t necessarily think it’s that helpful in managing [instructional design] or performance consulting work. I’d be very curious to start seeing what happens as you start seeing certifications wrapped around agile [certification] . . . You know, it’s like, I would be far more interested in an agile [certification] that was actually focused on E-learning or performance support, performance improvement kind of thing.*

Although there is no consensus of support for project management certification, several participants shared their experiences working on both ID projects and for higher education organizations of different sizes. They noted that the size of the project or organization may influence whether certification is necessary. Specifically, if the project or organization is large, then professional project managers may actually take the place of IDs who are focused on project management. Such professionals who focus solely on project management may actually benefit from gaining project management certification. However, for IDs working on smaller projects as part of smaller organizations, the likelihood of becoming an ID project manager increases. Therefore, whether project management certification is necessary for these project managers is more of a personal decision rather than essential. The key in this case is to acquire the essential project management KSAs, either through certification, other training, or through professional experience. One participant explains that "[f]or projects [which] are big and complex, I'd much rather have someone who specializes in project management and can run four or five difficult projects for me at the same time." The same participant then elaborated that:

> *If you're going to only work in big organizations, it may not be as critical for you. Then it probably limits your options later on . . . for me it was important. Not to have the certification, but certainly to have the skills. [For instance,] it allowed me to manage when I was independently running projects. Now, it matters less to me [in the larger organization] because I'm going to specialize and hire people who are just project managers. As you move into larger organizations, I think it's better to specialize in that, so we use project managers. And that's what they do, they're not [IDs]; they're people who are trained and learned project management.*

Project Management Technology Resources

The technology resources that project managers need to use when managing educational technology projects span across KSAs. Technology resources are some of the more tangible tools and techniques that practitioners use and can include both hardware and software tools developed specifically for project management or other general productivity purposes (PMI, 2017). The technology resources mentioned by the project managers were vast, and many reflect the professional preferences of a particular respondent or the needs of their organization. For simplicity, some of the resources and their stated purposes are summarized in Table 1. The technology resources listed can be linked to project management processes (e.g., the process "develop project charter") defined in the current version of the PMBOK. Participants did not identify a single technology resource that was universal to the craft of project management. However, several general purposes and technology resources did reoccur across the participants. We noted that many of the technology resources and stated purposes listed are for communication management functions (e.g., team collaboration) among the various project stakeholders or focus on schedule management functions and include things like collaborative calendars, Gantt charts, and to-do lists. What is clear is that these project management professionals must be abreast of multiple technology resources to function in their work environments.

Table 1

Resources: Technology and purpose in project management.

Technology	Purpose
Microsoft Project	Scheduling, resource allocation, Gantt charts
Microsoft Word	Scope of work (memorandum of understanding), project charter, issue/bug tracking, and status reports
Microsoft Excel	Budgeting and project charter
Microsoft Outlook and other email	Client, team, and other stakeholder communication
Google Suite, Google Smartsheet, Google Hangouts, and SharePoint	Team communication, collaboration, and agile scrums

Technology	Purpose
Google Docs	Collaboration and archiving
Trello, Slack, and Basecamp	Streamlined project management processes and scheduling
Tableau	Data display
Google Sheets and Google Calendar	Scheduling
Polycom and Yammer	Video conferencing
JIRA, Bugzilla, and Mantis	Agile project management and issue/bug tracking
Daily Scrums	Agile project management
Subversion	Document sharing and revision control
Toggl	Time tracking and timesheets
To-do list app (and manual lists)	Time management
Microsoft PowerPoint	Presentations and storyboarding
Qualtrics	Project research and data collection
Sharedrive and Google Drive	Project archiving
Working knowledge of HTML, JavaScript, and Flash	Communication with developers
Video and graphics production terminology	Communication with developers
Learning management system basics	Communication with team and faculty stakeholders
Paper calendars	Scheduling
Traditional whiteboards and flipcharts	Planning and brainstorming
Phone and text messaging	Communication
Various templates and hardcopy documents	Project documents, course blueprint, and archive data

Knowledge

All 13 participants had academic backgrounds in educational and instructional technologies as well as e-learning and learning technologies, both of which they highlighted as essential to their role as project managers in the field of educational technology. They perceived their academic backgrounds as providing them with essential educational technology project management knowledge in the following areas: instructional design models, practice, and theories (11 participants); learning and pedagogical theories and strategies (4 participants); learning sciences (2 participants); or research, data analysis, evaluation and assessment (3 participants). One participant stated that an “academic background in instructional design teaches you how to problem-solve. It teaches you how to keep goals, project goals, long-term organizational goals at the forefront of your planning.” Meanwhile, another participant said:

> *[Project managers] have to have a good command cognitively of the elements that make up the instructional design model that they're using in the project. In, you know, whether it's ADDIE [Analysis, Design, Development, Implementation, and Evaluation] or some other model that they're using rapid prototyping or whatever. As the project manager in successfully managing that project they have to know . . . be well versed in that particular model and the tasks associated with each phase of development within that model . . . So that kind of knowledge is important.*

Several participants mentioned that their academic backgrounds gave them confidence to communicate with their project team and stakeholders. They acquired the vocabulary to communicate with their stakeholders, be it

pedagogically, or through research or leadership. One participant stated, “I found that it helped me to have confidence speaking to some of these people who had been working with many of these things for a long time.” Another stated that he “was able to translate the vocabulary of the field into common language,” while yet another stated that it gave him credibility with his stakeholders. All participants highlighted the importance of project management skills as essential to their roles. They cited knowledge gained through prior teaching experience, professional experience as an ID, experiences with diverse projects, and other types of professional opportunities as valuable to project managers in their field.

General Business and Institutional Knowledge

The first category of “essential knowledge” relates to the higher education institution itself, that is the context in which educational technology project work is done. By being cognitively aware of the organizational context in which educational technology projects are situated, the project manager ultimately becomes more effective at aligning project-level goals with the greater strategic objectives of the institution. Regarding the institution, all 13 participants voiced the need for educational technology project managers to have various types of general business and institutional knowledge. In particular, all 13 participants stressed the importance of having professional levels of interpersonal intelligence and strategies and having broad familiarity with the commonly used technologies and tools needed for conducting office work, managing projects, or performing instructional design and development tasks. Although most of the participant responses about the category of “interpersonal intelligence” were directly centered on a variety of soft *skills* and not necessarily *knowledge*, it is evident from their responses that having an active understanding of the complexities of social interaction as well as the motives, perspectives, and needs of the people around them is essential when managing even the simplest of projects in the educational technology field. Likewise, such an understanding of complex projects also requires deep knowledge of implementation strategies for the various interpersonal skills reported. The importance of knowing *how* and *when* to use a particular skill or ability was a common theme among all 13 participants.

In support of having broad awareness of various technology resources, one participant stated:

> *I think it's also important for a successful [instructional design] project manager to at least have a working knowledge of various programming languages, video production terminology, [and] graphics-production terminology. I'm not saying that they need to be programmers or video producers or graphic artists, but they certainly need to know how to communicate within those specific genres associated with the development of a course, or a program, because absent that communication they're not gonna be able to handle those elements of the project.*

Other types of general business and institutional knowledge that emerged throughout the interview process include: knowledge of communication strategies for working with diverse project team members and stakeholders (7 participants); being well-versed with various work prioritization tactics (4 participants); decision-making strategies (2 participants); ethics and copyright laws (2 participants); research techniques (2 participants); consulting, collaboration and general budgeting concepts (2 participants); and principles of emotional and organizational intelligence (4 participants). In emphasizing the principles of emotional and organizational intelligence, one participant stressed the importance of “knowing how the organization works so you can work that organization. So how are things done? Who’s where? Where are the big paying points? Where are the opportunities? What’s the nature of your business? What things are keeping people up at night?” Similarly, another participant added that the educational technology project manager should be “[e]motionally intelligent enough, socially intelligent enough to quickly determine what it is the stakeholders need, and then focus the communication directly to that need, and that's it. Nothing else.”

Project Management Process Knowledge

The second category of knowledge to emerge was “project management process knowledge.” Participants noted that educational technology project managers needed comprehensive project management process knowledge to help guide them through the various overlapping phases and processes involved in managing multiple and diverse projects.

When asked what type of knowledge is deemed essential, one participant emphasized knowing the basics of integration:

> *[Project managers] need some basic project management skills, knowledge in order to keep track of all the various pieces that have to come together, and as we both know instructional design is an organic process. It's not as linear as we would like to think it is. And so, lots of details, and lots of things that could fall through the cracks with someone who is not attentive to those types of details and keeping everybody on track.*

Other participants not only recognized the importance of knowing project management basics, but also stressed a core responsibility of the project manager is knowing how to allocate and manage with finite resources to achieve the project goals. One participant stated:

> *I think understanding the phases of project management, and understanding when you have more flexibility, when you have less [emphasis added]. You know, there's a curve that tells you, you know, the further you get into a project, the more costly and the less effective changes become. So understanding that and managing with that knowledge is very important.*

Among the core project management areas identified by participants as requiring a certain depth of knowledge include: project team management (12 participants), project management foundations and practice (7 participants), project scope and needs assessment (7 participants), project scheduling and time management (5 participants), stakeholder engagement (3 participants), budgeting and cost management (2 participants), and resource estimation and management (2 participants). Within the largest of these subcategories of project management knowledge--"project team management"--participants emphasized the need for the project manager to understand the roles, skills, and abilities of the team members: (6 participants) in order to be successful. One participant explained this idea in this manner:

> *As a project manager you really have to have a solid understanding of the roles that you're managing, right? It doesn't mean that if you are managing a content developer, and a content designer, and a media developer . . . It doesn't mean that you have to be able to build the media. It doesn't mean that you have to have that same attention to detail that a content developer does or that you have to be able to master or have a mastery of all of the, you know, learning theories or design approaches that an [ID] does, but you do have to have an awareness of what all goes into that . . . in order to be able to appreciate the process and also estimate how much time it's going to take for that process.*

In terms of engaging different stakeholders, six participants mentioned the importance of understanding scope definition and the challenges associated with it. One participant explained:

> *You know the scope of work [that the stakeholder is] going to come up with is going to be, you know, huge. And so one of the things that we did to help on the project management side is in the early analysis stuff, we just put in a whole bunch of questions from one deliverable to the next. Are you scoping this appropriately? Is this appropriately scoped?*

Still another participant emphasized the importance of knowing the scheduling and time management needs of the project and the individual team members. (Although all participants managed teams as a project management responsibility, some of the participants had sole responsibility for project and team scheduling.) However, on this participant's team, each member was responsible for scheduling the completion of their own tasks:

> *[Those on the team] do typically two levels of scheduling. There's a high-level schedule that's major project milestones. The other level of schedule is a lot more detailed, and we're calling those serial review schedules. And it's how a team will take a particular deliverable and the process that they use to get that deliverable out and through everybody for review.*

Instructional Design Knowledge

In addition to having broad business and institutional knowledge as well as project management process knowledge, the third category of knowledge to emerge was "instructional design knowledge."

All 13 participants felt that educational technology project managers need a solid understanding of instructional design in order to effectively manage projects, team members, and stakeholders in the higher education environment. Project managers need to have a wide range of foundational knowledge in their field to recognize and coordinate the many interconnected parts of their projects. For instance, one participant stated:

> *I don't have to be a content expert in the area; that's the faculty member's job, or the subject matter expert. My job is to have knowledge of instructional design theories, pedagogy, best practices, and then take their [faculty or subject matter expert] content and their goals, and put it in, put it to work. So to me, the knowledge of the instructional design theories, pedagogical theories, brain research, you know, understanding how students learn.*

All responses related to the category of "instructional design knowledge" fell within the areas of instructional design best practices (6 participants), instructional design models and theories (5 participants), and learning and pedagogical theories (4 participants). The importance of project managers getting real-world knowledge through professional experience working on instructional design projects – with real people and a variety of modalities – was a common theme of the participants. One participant summarized this perspective by stating the following:

> *[As project manager,] you do have to be up on best practices, in terms of course design, in terms of working with the subject matter experts. Some of those interpersonal skills are really important, and if you don't have that ability to work with people, you're not even gonna get off the ground with a project management project or course design or other.*

All 13 participants stated the importance of being knowledgeable of the basic ADDIE model or other design-based approaches to managing projects, and eight participants highlighted the importance of backward design to their job roles. One participant explained this in the following way:

> *My project management probably looks a lot like an instructional design model. So the instructional design model is gonna be[,] what would the outcome be? And what are the assessments? We really have moved in the last several years to using the backward design model. And so we look at, what are the outcomes. Then, how are we gonna assess whether we got to those or not? And then what are the steps in getting there in terms of project management?*

Another participant described her approach to project management through a design-based lens:

> *We really use these days more of a design approach [in which] we have a spiral model, and the integrative approach where we try to turn out a prototype, test the prototype, modify the prototype in a continuous cycle like that. So, we've gone over time from the more waterfall approach to much more of this cyclical design thinking type of approach.*

Yet another approach mentioned was a focus on performance improvement, or the human performance technology perspective. A participant with this perspective stated:

> *We look at all this stuff through a performance improvement lens . . . We frame it within the context of, you know, we either have a problem where people aren't doing what they need to, or we've got a future opportunity where we need people to do something different than they are. And when you frame things that way, you need to start looking at, you know, what is the gap in performance? What is the difference between expected and actuals? And given that difference, is the gap worth closing? And given a gap that's worth closing, what are its causes?*

Participants preferred specific approaches, such as iterative or performance improvement approaches, and provided examples of different models they used in their jobs. However, they all stressed knowledge of different models as an essential part of the project manager's repertoire. While all 13 participants identified instructional design models that they used in their own practice to manage projects, some also mentioned the importance of having knowledge of proprietary models, of agile project management approaches, of rapid-prototyping, of active learning, and of program review processes as useful for project managers. One of the participants even acknowledged that intuitive and *informal* systems to managing projects have their place as well, instead of just a focus on "Gantt charts and rigorous documentation."

Skills

Just as gaining knowledge of instructional design through experience was a common theme, acquiring project management skills through hands-on experience was also a commonly discussed topic across participants. The nature of such experience occurred within both formal training and professional contexts in the workplace. To illustrate the importance of hands-on experience, one participant commented on the importance of a project manager being able to differentiate between the roles of ID and project manager yet interconnect them again when needed.

Another participant noted the value of having real experience in actual course design in order to manage projects:

> *[As a project manager,] you still need some real background of what course design looks like, and what kinds of things are appropriate in an online or a hybrid or a face-to-face setting. You know, you have to know that certain types of learning activities are gonna work in one modality or another or be more effective or not be more effective.*

In terms of essential skills needed to manage educational technology projects in higher education contexts, participant responses fall within one of four dominant skill categories: project planning and management (90 references across participants), general management and design skills (35 references), interpersonal and communication skills (33 references), and intrapersonal (i.e., self-mastery) skills (18 references). Of these four overarching categories of essential skills, 24 separate subcategories were also identified and are discussed in this section.

Project Planning and Management Skills

Within the first category, there are nine subcategories of skills that directly relate to planning and managing various project components. These subcategories reflect nine out of ten knowledge areas of the PMBOK. Particularly noteworthy is that all 13 participants considered it essential for the educational technology project manager to have skills in the areas of "determining project scheduling strategy," "determining project scope and needs," and "developing the project team." In relation to the "determining project scheduling" category, one participant noted various elements needed to show these skills:

> *Well, you want to know what are the outcomes that you're gonna have at the end of that project. And so thinking from a management perspective, it's breaking it down to the tasks and so forth that need to be done, setting up some sort of timeline for that with milestones and so forth, and looking at what kind of resources you're gonna need for those kinds of things.*

Yet another participant discussed the need for scope-management skills, while a third participant discussed various sub-skills needed to become skilled at "developing the project team":

> *You will also need to be able to build and appreciate rapport with others, right? You have to be able to empathize, 'cause I mean it's very easy for a relationship to become adversarial, right, for whatever reason. Maybe the person's having a bad day. It can become very adversarial and you need to be able to empathize with them and not just react when you're having that. . . . But one of my early project managers, he was amazing at, first of all really appreciating his team, and appreciating our needs to work well together, right? You have to be able to recognize when your team needs some bonding moments in order to get over the finish line or whatever, and when you need to be a little bit silly.*

Another essential project planning and management skill that was discussed by a large majority of participants is managing stakeholder engagement (11 participants). In one discussion, a participant referred to the project manager as a "consultant-collaborator" with the stakeholders and the project as "surfing," in which "everything is going to move underneath your feet as you're going along." In this discussion, the participant implied that most project management processes, including the management of stakeholder engagement, involve some type of surfing:

> *And so if you think about the other aspects of project work, one of those aspects is consulting and collaborating with your client in ways that don't let them do stupid things, and in ways that shape their expectations, and in ways that are collaborative because they know how their organizations work; we don't. And so we have to find this kind of balancing point between the strong suits of [ID]/performance consultant and clients.*

General Management and Design Skills

In relation to general management and design, all 13 participants identified having broad technological skills as crucial for the educational technology project manager in higher education. Participants stated that project managers should be skilled at using information and communication technologies, using project management software, designing project charts, and using other scheduling and budgeting tools. Some participants also emphasized the importance of having broad skills in programming, video production, and graphics production for project managers. Participants agreed that the educational technology project manager needs to have some skills in using common productivity technologies (e.g., Microsoft Suite, Google Docs, Microsoft Outlook) for general day-to-day purposes. Still other participants highlighted skills in using project management-specific software such as Microsoft Project.

Other general management and design skills mentioned by participants fall within one of three additional subcategories: general management skills (10 participants), research skills (9 participants), and instructional design skills (3 participants). The first of these, general management skills, consists of various miscellaneous skills mentioned by two or fewer participants each. These include skills like creating project value (2 participants), determining the project management approach (2 participants), and using agile (2 participants) and linear (2 participants) project management models. One participant listed the research skills needed by project managers:

> *. . . so, the ability to conduct focus groups, the ability to write a survey and implement a survey, and then review the data, analyze the data, come up with hopefully a learning solution or a problem solution at the end of those analyses that we do.*

Interpersonal and Communication Skills

All 13 participants placed great emphasis on general interpersonal skills (i.e., people skills) and communication skills. Like general management skills, the skillset identified as general interpersonal skills includes a synthesis of various interpersonal skills, each of which was mentioned by two or fewer participants. Skills in this general category include assertiveness (2 participants), collaboration (2 participants), diplomacy (2 participants), empathy (2 participants), listening (2 participants), negotiation (2 participants), confidence-building (1 participant), and teaching (1 participant). As for communication, although all 13 participants identified communication skills as essential when dealing with stakeholders, clients, and team members, there were two major areas of emphasis into which communication skills fell: clear and consistent communication (9 participants) and general project communication (8 participants). Regarding project managers maintaining clear and consistent communication, one participant talked about being able to explain a concept in multiple ways and that "[y]ou have to be a good communicator. You have to be clear. And realize that even though you think you're being clear, you have to realize how the other person needs to hear it in order for them to understand it." Another participant described clarity in communication in terms of careful articulation of project outcomes based on realistic expectations:

> *It's [our] role, I think, to listen, to take what [faculty] say and then be able to craft that into a very tangible measurable outcome. And be able to articulate that back to the client, so to speak, the faculty member, the*

> *academic department, whoever might be initiating or ultimately using this piece of instruction so that you're clear that you all have realistic expectations.*

As for having general communication skills, the same participant explained this type of skill as "keeping everyone informed, assessing the progress, setting up milestones" and that everything needs to be "guided towards that shared vision." In relation to essential communication skills, not only did the participants emphasize effective communication for project managers, but they also stressed skills in managing expectations, input, and communications between stakeholders and the project management team.

Furthermore, according to participants, project managers who have well-developed interpersonal and communication skills are better equipped to "acquire the right team members" (3 participants), "understand team roles and assign them according to team members' skills and abilities" (8 participants), and "facilitate team collaboration" (6 participants) for successful project completion on the timeline. One participant reflected:

> *. . . the most important [element for project success] really is that collaboration and communication piece because [the team] start off as strangers, and if they're going to do well in the course, they need to work through storming and norming to become a high performing team. And they're going to do that because everybody is in on this, even people with a lot of experience. They're going to slip schedule, and they're going to have to overcome it.*

Finally, in addition to the categories previously mentioned, project managers need to have background knowledge on the strategies needed to develop emotional intelligence (discussed under "Knowledge" above), three of the participants underscored that skills related to emotional and social intelligence are most vital to deal with a wide range of relational scenarios that a project manager may face when working with a diverse team or set of stakeholders.

Intrapersonal Skills

Within this category is a set of widely varying general intrapersonal skills that all participants argued were important to project managers. These include understanding oneself, particularly those desires, intentions, moods, strengths and weaknesses with which each person must live. Although all 13 participants cited skills that fall within the category of "general intrapersonal skills," only two types of "self-mastery" skills were identified as essential by three or more participants: personal time management (5 participants) and focus on details (3 participants). Other intrapersonal skills identified include an appreciation for process (1 participant), flexibility and adaptability (1 participant), taking initiative (1 participant), possessing organization (1 participant), having persistence (1 participant), self-reflecting (1 participant), maintaining self-responsibility (1 participant), and having tolerance for ambiguity (1 participant). One participant summarized her view:

> *I think you have to have a high tolerance for ambiguity, in the initial stages of the project, because a lot of times when you're working with clients, they may not know what they want, and they may have just a vague idea, and you kind of got to be willing and able to go with that and sort of explore the outcomes that you're trying to achieve as you move forward.*

Abilities

The third and final dominant theme that emerged in the data is "essential abilities," or "the capacity to perform an activity" (Ritzhaupt et al., 2010, p. 427). As for essential abilities that project managers need to manage higher education projects, 42 distinct ability statements were identified across participant responses, and each ability statement aligns with one of 11 overarching ability categories. Of these 11 categories, nine directly relate to managing various project aspects and, interestingly, align rather closely with nine out of ten knowledge areas of the PMBOK. The nine categories of abilities that align with the PMBOK include using and managing resources (54 references across participants), managing stakeholders (17 references), managing schedules (15 references), managing communications (12 references), managing scope (9 references), managing project integration (8 references), managing cost (4 references), managing risk (3 references), and managing quality (1 reference). The two remaining categories of abilities

in this study include general “project-wide” abilities (59 references)–which apply across multiple project phases–and industry-specific abilities (12 references). This section provides an overview of those abilities cited most often by participants–and thus deemed essential.

Project Management-Specific Abilities

The PMBOK (2017) standard tells us that a primary project management goal is “to meet the project’s objectives and stakeholders’ expectations” (p. 53), which is accomplished through balancing “the competing constraints on the project with the resources available.” In alignment with the primary project management goal of managing stakeholders, the one ability statement for which all the participants in the current study agreed was the ability to proactively manage stakeholder expectations and engagement (13 references). In a discussion on engaging and managing the expectations of faculty stakeholders, one participant stated it like this:

> *I would say proactive. Getting back to that sort of people skills, you kind of have to manage your client, sometimes the expectations to the client, but sometimes the actual getting input from clients. Again, university faculty are typically pretty busy people. And their job description isn't necessarily centered around instructional development.*

In the area of scheduling, all participants considered it essential for project managers to be able to develop and follow a project schedule (13 references) in order to manage time contraints. To highlight the importance of being able to develop and follow a project schedule, one participant mentioned that “all of those aspects of producing, of course, successfully, and adhering to a project management plan or timeline . . . If the project manager is not knowledgeable about those kinds of details, those can actually be the fly in the ointment that holds up the project from being delivered on time and within budget.”

Similarly, most of the participants believed that various communication-related abilities were a vital part of the educational technology project manager’s arsenal. However, while 12 participants deemed it essential to be able to communicate clearly, openly, and constantly in order to manage project communications, the emphasis of each participant varied widely. For instance, one participant stressed the ability to communicate clearly, while another focused on the ability to communicate in a transparent manner with an “open-door” approach to communications. Yet another participant highlighted the ability to focus communications to meet the needs of the stakeholders:

> *And so, part of the project manager’s responsibilities might fall in the area of negotiating different timelines or different resource options that might be available. So some negotiation skills, I think, are helpful as well, but good, solid communication skills, and understanding what it is each of these stakeholder groups really needs to know in order to make a decision . . . and that's where the communication needs to be focused. I work with a lot of instructional design graduate learners who want to go into a lot of lengthy explanation about the process, about the value of instructional design, about how it happens, who all's in. And these stakeholders, they don't care. That's not what they wanna know, so the instructional design project manager needs to be political enough to quickly determine what it is the stakeholders need and then focus the communication directly to that need.*

In relation to using and managing resources, all 13 participants deemed it essential that educational technology project managers have the ability to use common technology software and terminology for instructional design projects. Although the types of technologies mentioned varies, participants all suggest that having the broad ability to use technologies and associated terminology is essential to communicate with people managed by a project manager.

Similarly, most of the participants further delineated the ability to use common project management software (10 participants), such as Microsoft Project or Gantt charts, as essential.

Other common overarching ability statements related to overseeing resources include managing people (9 participants) and managing all (non-human) resources (8 participants). In relation to managing people, one participant noted that “[i]t comes down to the management piece of it though. Of how do you effectively manage people? I think [that is] the key to

me at least." Likewise, key statements that various participants used to describe the ability to manage all resources include "identify resource requirements," "estimate properly," "allocate resources to accomplish an end," and "you have time, money and resources, and you have to balance those out."

The final two categories of essential project management-specific abilities include: managing scope (9 participants) and managing project integration (8 participants). Of these dominant categories, the specific participant statements of essential abilities include determining the project's scope of work (9 participants), developing and following project plans and tools (4 participants), and evaluating project outcomes and status (4 participants). To this end, a participant noted that:

> *Spending time to [develop and] really assess what the client wants, what's expected, and then articulating that so that the whole team understands it, I think is where it all begins. And then once you have that, then it's basic instructional design and project management. What are the milestones? What are the steps? Who are the people? What are the resources? What are the timelines? And then just planning the rest of it and working that plan.*

Finally, while some participants noted useful abilities related to the larger project management categories of "managing cost," "managing risk," and "managing quality" (4, 3, and 1 participant[s] respectively), ability statements in these categories were not widely mentioned by the participants.

General "Project-Wide" Abilities

In the current study, all 13 participants recognized the need for project managers to have general abilities that apply across project tasks, phases, or even the life of a project. Altogether the participants identified 18 distinct "project-wide" ability statements. Within this category, only one ability statement was held in common among most participants. The ability to apply general interpersonal skills was discussed by 12 of 13 participants. One participant described the importance of this ability in the following way:

> *So the first and foremost is the people skills, or rather people abilities. You've gotta be able to relate; you have to be able to listen, what is their end goal, you know, what do they wanna achieve, and they're gonna tell you, they want to do 1, 2, 3 and achieve X, Y, Z, and you have to figure out how to make them understand [participant laughs] 'cause they're two different processes coming together.*

Yet another participant focused instead on project managers possessing an interpersonal skill such as assertiveness, which he termed "the ability to push in a nice way." He further elaborated that "you wanna remain friendly, but you've got to, you know, with each successive message or phone call, you've got to up the pressure to perform." Only one specific interpersonal skill–the ability to work well with others (7 participants)–was a shared response by more than half the participants. While there was broad variety among participants regarding which general project-wide abilities are essential, three particular ability statements were discussed by at least five participants. These include the abilities to apply different project management lens to each project (6 participants), to apply suitable project management principles (5 participants), and to manage diverse project details (5 participants). In the words of one participant:

> *The last part of this project beast is the notion of the project management. How do you deliver quality work on time within budget? How do you manage changes? What kinds of project management approaches do you use given the kinds of risks that you need to mitigate in the project? How do you identify and classify "risk?" How do you work with others to mitigate those? And, you know, in order to deliver quality work on time and budget that the client's actually going to value, because at end of all this stuff, you deliver value behavior change in the workplace.*

Industry-Specific Ability

Although participants in this study only identified one ability statement that applies to the level of the industry or organizational context, this ability statement represents a significant consensus among the participants. Specifically, 12

of 13 participants noted the importance of having the ability to apply instructional design principles and theories of teaching and learning. For instance, one participant this ability in the following way:

> *My job is to have knowledge of instructional design theories, pedagogy, best practices, and then take their content and their goals, and put it in, put it to work [i.e., to apply it]. So to me the knowledge of the instructional design theories, pedagogical theories, brain research, you know, understanding how students learn . . .*

Discussion

Before drawing conclusions and interpreting the findings of this study, it is important to take note of the limitations of this study. This is a qualitative inquiry with an intentionally small and homogeneous sample, and as such, these data should not be generalized to the larger population of educational technology project managers. Instead, these results should be viewed as "transferable" to the reader's professional experiences and background in their contexts. Further, the participants in this study were largely representative of the United States as they were recruited from AECT, and participants practiced project management in the context of higher education settings. Readers should be cautious in transferring the findings of this study to other educational technology contexts (e.g., the military), and especially, other disciplines (e.g., construction management). Also, we only interviewed participants on one occasion, and we did not collect additional data sources (e.g., each participant's resume or curriculum vitae) to triangulate the findings from the study, which could have enhanced the validity of our results. Finally, the participants in this study served as the source of expertise (per our selection criteria) about educational technology project management in higher education. Thus, our findings are subject to the experience of the professionals in our limited sample. The results of this study may be applicable to other educational technology professionals with project management experience in higher education.

With these caveats in mind, this research has expanded our understanding of the project management competencies of educational technology professionals working in institutions of higher education. The findings from our study illustrate that educational technology professionals practicing project management must possess a wide variety of competencies to fulfill their roles and responsibilities. Consistent with previous research (Ritzhaupt & Kumar, 2015; Kumar & Ritzhaupt, 2017), our findings show that educational technology professionals in higher education identify faculty members as being their primary stakeholders. Although students are the main audience of much of the project manager's work, faculty members are often perceived as both the client and subject-matter expert in higher education settings. The participants in our study all had academic backgrounds in the broad field of educational technology with formal training in topics like learning theories, instructional theories and strategies, instructional design and development models, learning sciences, research, data analysis, evaluation, and assessment. However, six of the participants had no formal training in the craft of project management. This finding is consistent with the reality that many educational technology programs do not offer coursework in project management (van Rooij, 2010; van Rooij, 2011).

The participants in this study blend instructional design model processes with project management processes to guide their work efforts and manage their projects effectively. This is not an unusual practice in the field of educational technology with educational technology professionals using methods like rapid-prototyping (Tripp & Bichelmeyer, 1990) or agile methods (Sweeney & Cifuentes, 2010) to serve as the project management function. Several of the participants noted using the principles of backward design to guide their creations and project efforts (McTighe & Thomas, 2003). Instinctively, the educational technology professionals are using project management processes, tools, and techniques without having detailed knowledge of formal project management methodology. Their knowledge of project management processes is often derived from the experiences of implementing their product development life cycles (i.e., instructional design models) with customized features. It would appear that educational technology professionals are tailoring instructional design models with custom project management processes to function within their work environments. Regardless, several of the professionals are unconsciously using formal processes mirroring the PMBOK without ever having been trained in this subject.

This is not to say that the professionals in this study did not have some background in formal project management. After all, more than half of the participants had taken at least one course in project management during their academic preparation. Several of the project managers described traditional project management processes, tools, and techniques, including things like defining and managing scope, estimating activity resources and durations, developing budgets, or developing schedules and timelines. Participants also noted that they used applications like Gantt charts, the critical path method, and project management software. The participants did not necessarily use the formal language presented here to describe the ideas, but nonetheless, the principles and ideas were still present in their narratives. Consistent with prior research (Ritzhaupt & Kumar, 2015; Kumar & Ritzhaupt, 2017; Kang & Ritzhaupt, 2015), educational technology professionals in higher education must be abreast of a wide variety of information and communication technologies, ranging from standard productivity tools like word processors and spreadsheets, to authoring packages to Learning Management Systems (LMSs) and cloud-based tools for collaboration. These tools are used for a range of purposes, to include scheduling, budgeting, conferencing, planning, communicating, storyboarding, and version control. It is therefore clear that project managers in the educational technology context must develop competencies in a wide range of processes and tools.

Also consistent with prior research, the role of communications skills and the ability to work with diverse stakeholders floated to the top of the list for many of these educational technology professionals (Ritzhaupt & Kumar, 2015; Kumar & Ritzhaupt, 2017; Kang & Ritzhaupt, 2015). Communications management and stakeholder management are two of the ten knowledge areas described in the PMBOK and are incredibly important competencies to develop as project managers. After all, Schwalbe (2015) reported that project managers spend as much as 90 percent of their time communicating with project stakeholders. Educational technology professionals serving in the project manager role also have to carefully balance client expectations with the resource constraints of the work environment and effectively lead project team members to achieve goals that are sometimes unclearly defined yet progressively elaborated as time passes. Both written and oral communication skills are essential to this role; project managers must be effective communicators and develop expertise in engaging with and managing stakeholders from diverse backgrounds. These findings are also consistent with the competencies described by the PMI Talent Triangle in the newest edition of the PMBOK, which emphasize technical competence in project management and the importance of leadership and knowledge of the business domain – in this case, higher education (PMI, 2017).

The educational technology professionals serving as project managers in this study had varying attitudes towards the value of professional certifications in project management. Most of the participants saw value in project management credentials, while others felt the PMP in particular was too linear and rigid. Prior research in our field has also questioned the importance of certifications like the PMP for educational technology professionals (Brill et al., 2006). Even project management scholars have reservations about the value of the PMP to professionals managing projects across disciplines and contexts (Starkweather & Stevenson, 2011). Nonetheless, what is clear from this research is that many of the project managers in the educational technology context that we interviewed are practicing the ideas described by the PMBOK with or without consciously realizing they are doing so. The PMP is intended to certify professionals from any industry (e.g., construction management, information technology) so that they may practice effective project management on any type and size of project. Many of the educational technology professionals interviewed in this research were managing smaller teams (less than 20 team members) and smaller projects (i.e., projects with duration of less than 6-months, with budgets less than $75,000, and with fewer than 10 stakeholders). Some of the processes prescribed by the PMBOK might seem inappropriate for smaller projects; thus, the question of value remains unanswered in the educational technology context, particularly in higher education. More empirical research is necessary to determine if these credentials are truly leading to better project management in educational technology.

The interview data we collected from these project managers touch upon most aspects of the PMBOK (e.g., knowledge areas). Again, the participants did not always use the jargon of the PMBOK to express themselves during the interview; nor were they expected to do so. What we can conclude is that educational technology professionals are practicing varying aspects of integration management, scope management, schedule management, cost management, communications management, stakeholder management, quality management, risk management, and resource

management in their regular work environments. In fact, they have developed their own tailored processes and domain expertise in these areas. Also evident in our data is that project managers are involved in the full life cycles of the projects from initiation to closing.

Though many aspects of the PMBOK were evident, there were also many aspects that were not present in our interview data. For example, we did not see as much evidence aligned with the processes within procurement management, which involves acquiring goods or services from vendors. Also absent from the interview data are specific project management tools, techniques, and processes outlined in the PMBOK and other project management literature. For instance, the Earned Value Management (EVM) method is a powerful and popular tool that supports the management of scope, schedule, and cost in an integrated mathematical framework supported by common project management software packages (Anbari, 2003). Quantitative and qualitative risk analyses were also not discussed, nor was the use of a risk register to manage the risk events for a project. The concept of a Work-Breakdown Structure (WBS) was also not mentioned directly, even though project management software such as Microsoft Project and Gantt charts were noted. These missing elements are likely a function of our interview protocol. However, future research needs to examine which processes are useful and which processes are not to project managers in educational technology working in institutions of higher education.

Recommendations for Practitioners

Professionals, professional associations, and academic programs may find this research useful in planning professional development opportunities and academic curricula. Project managers in our field can assess the extent to which these findings are applicable to their work environment and employ some of the many ideas presented in their own professional practices. Aspiring project managers can use this study to assess their current competencies and plan learning events to prepare them for this important role. Professional associations such as AECT, the Association for Talent Development (ATD), or the International Society for Performance Improvement (ISPI) can work to refresh their standards and credentialing programs (e.g., ATD's Certified Professional in Learning and Performance) to target specific project management competencies relevant to the field. Professional associations, like the Online Learning Consortium (OLC), are already offering professional development experiences focusing on project management in higher education (OLC, 2018). Academic programs in the field of educational technology should start to address the gap in project management curriculum in our field by offering robust courses and authentic project experiences to prepare educational technology professionals for their increasingly complex work environments.

Recommendations for Researchers

Future research on the role of project management in educational technology is a fruitful research avenue with ample opportunities to address questions of both theoretical and practical significance. As the present study was an exploratory study using qualitative procedures, some of these findings may be useful in contributing to the development of a survey or other data collection tools for educational technology professionals working as project managers. A large cross-sectional sample of professionals across the United States, and even beyond, would provide useful information in understanding the roles and responsibilities of project managers within our discipline. This information is also useful for human resource professionals to acquire the appropriate professionals to serve in these roles. As this study focused on those individuals within a higher education context, it would also be advantageous to interview professionals in educational technology working in other contexts, like business and industry, the government, the military, or K-12 education. These data could be compared and contrasted to examine the moderating influences of the contexts in which the project manager works. At some point, we will have to examine the influence of credentialing systems like the PMP on the practices of project managers of professionals in the field of educational technology and the overall success of projects managed by those professionals.

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Appendix A: Interview Questions

General

1. Please talk a little about your academic and professional background. Do you think your academic background has helped you in your professional responsibilities? If so, how? (If not, why not?) Please explain.
2. Please explain how your role fits within the organizational structure of your institution.
3. (Who do you report to? Also, what function[s] do the team members play in your work?)

Project Management

1. In terms of project management, how many years of formal (or formalized) experience managing projects would you say you have at this point?
2. From your experience, what knowledge, skills, and/or abilities should you possess to be successful in managing projects?
3. Who do you consider to be the primary project stakeholders you work with most frequently? Which of them would you consider to be most critical?
4. Are project management models, processes, or standards useful in your job? If so, which ones?
5. What type of project management preparation or training would you recommend for your position (if any)? What advantages are there in holding a professional certification in project management (if any)?
6. What specific types of technology or tools do you use most frequently in your line of work when managing projects?
7. In your opinion, what general aspects of managing projects require the most attention and/or challenge in your role?

Wrap-up

1. What would you consider to be a successfully managed project?
2. From your professional experience, what would you consider to be your greatest lesson learned about managing projects?

Appendix B: KSA Categories and Subcategories

Table 2

KNOWLEDGE (3 Categories; 20 subcategories identified)

CATEGORY 1 – General Business and Institutional Knowledge	**49**
Interpersonal Intelligence and Strategies	13
Common Technology and Tools	13
Communication Strategies	7
Emotional & Organizational Intelligence	4
Work Prioritization Tactics	4
Decision-Making Strategies	2
Ethics and Copyright Laws	2
Research Techniques	2
Consulting and Collaborating Techniques	1
General Budgeting Concepts	1
CATEGORY 2 – Project Management Knowledge	**38**
Project Team Management	12
Project Management Foundations & Practice	7
Project Scope and Needs Assessment	7
Project Scheduling & Time Management	5
Project Stakeholder Engagement	3
Project Budgeting and Cost Management	2
Project Resource Estimation and Management	2
CATEGORY 3 – Instructional Design Knowledge	**16**
Instructional Design Best Practices	6
Instructional Design Models and Theories	6
Learning and Pedagogical Theories	4
Top Knowledge Statements (at least 7 participants)	
Interpersonal Intelligence and Strategies	13
Common Technology and Tools	13
Project Team Management	12
Communication Strategies	7
Project Management Foundations & Practice	7
Project Scope and Needs Assessment	7

Table 3

SKILLS (4 categories; 24 subcategories identified)

CATEGORY 1 – Project Planning and Management	**90**
Schedule Management Skills	
Determining Project Scheduling Strategy	13
Managing Project Schedule	7
Scope Management Skills	
Determining Project Scope & Needs	13
Managing Project Scope	3
Team Management Skills	
Developing Project Team	13
Managing Project Team	7
Hiring Project Team	3
Managing Stakeholder Engagement	11
Identifying and Managing Project Risk	7
Budgeting and Managing Costs	5
Planning and Managing Communications	5
Managing Project Change	2
Setting and Managing Quality Control	1
CATEGORY 2 – General Management and Design	**35**
Technological Skills	13
General Management Skills	10
Monitoring & Controlling Project Work	
Creating Project Value	
Determining Project Management Approach	
Skill with Agile Models	
Skill with Linear Project Management Models	
Research Skills	9
Instructional Design Skills	3
CATEGORY 3 – Interpersonal and Communication	**33**
General Interpersonal (mentioned by ≤ 2 participants)	13
Assertiveness	
Collaboration	
Diplomacy	
Empathy	
Listening	
Negotiation	

Confidence-Building	
Exploring Potential Outcomes	
Teaching	
Emotional and Social Intelligence	3
Communication	
Clear & Consistent Communication	9
General Communication	8
CATEGORY 4 – Intrapersonal	**18**
General Intrapersonal (mentioned by ≤ 2 participants)	13
Appreciation for Process	
Flexibility and Adaptability	
Initiative	
Organization	
Persistence	
Self-Reflection	
Self-Responsibility for Project Issues	
Tolerance for Ambiguity	
Personal Time Management	5
Focus on Details	3
Top Skill Statements (at least 7 participants)	
Determining Project Scheduling	13
Determining Project Scope & Needs	13
Developing Project Team	13
Technological Skills	13
General Interpersonal Skills	13
General Intrapersonal Skills	13
Managing Stakeholder Engagement	11
General Management Skills	10
Clear & Consistent Communication	9
Research Skills	9
Open Communication	8
Identifying and Managing Project Risk	7
Managing Project Schedule	7
Managing Project Team	7

Table 4

ABILITIES (11 categories; 42 abilities identified), Corresponding to PMBOK Knowledge Areas (PMI, 2017, p. 25)

CATEGORY 1 – Using and Managing Resources (23 distinct ability statements)	**54**
Use common software and terminology for ID projects	13
Use common project management software	10
Manage people	9
Manage all (non-human) resources	8
Estimate project resources accurately.	3
Use team member skills effectively	3
Meet needs of team members	2
Plan, conduct, and manage meetings	2
Advocate for project team	1
Hire the right team members	1
Motivate team members	1
Reward team	1
CATEGORY 2 – Managing Stakeholders	**17**
Proactively manage stakeholder expectations and engagement	13
Consult and collaborate with clients	4
CATEGORY 3 – Managing Schedules	**15**
Develop and follow a project schedule	13
Determine project's critical path	2
CATEGORY 4 – Managing Communications	**12**
Communicate clearly, openly and constantly	12
CATEGORY 5 – Managing Scope	**9**
Determine project scope of work.	9
CATEGORY 6 – Managing Project Integration	**8**
Develop and follow project plans and tools	4
Evaluate project outcomes and status	4
CATEGORY 7 – Managing Cost	**4**
Develop and follow a project budget	4
CATEGORY 8 – Managing Risk	**3**
Develop and follow a risk management plan	2
Apply appropriate risk responses	1
CATEGORY 9 – Managing Quality	**1**
Deliver quality work on time and on budget	1

CATEGORY 10 – Industry-Specific Abilities	**12**
Apply instructional design principles and theories of teaching and learning	12
CATEGORY 11 – Project-wide Abilities (18 distinct ability statements)	**47**
Apply general interpersonal skills (see Skills table)	12
Work well with others	7
Apply different project management lens to each project	6
Apply suitable project management principles.	5
Manage diverse project details	5
Teach, mentor, and provide feedback	4
Find solutions to problems	3
Conduct research and analysis	2
Develop and implement contingency plans and workarounds	2
Expect and manage change	2
Manage paperwork and routine tasks	2
Multitask	2
Perform negotiation tactics	2
Adhere to ethical and legal requirements	1
Deliver quality work	1
Design project charts	1
Manage multiple projects	1
Take responsibility for actions	1
Top Ability Statements (at least 7 participants)	
Develop and follow a project schedule	13
Proactively manage stakeholder expectations and engagement	13
Use common technology software and terminology for instructional design projects	13
Apply general interpersonal skills (See Skills table)	12
Apply instructional design principles and theories of teaching and learning	12
Communicate clearly, openly, and constantly	12
Use common project management software	10
Determine project scope of work	9
Manage people	9
Manage all (non-human) resources	8
Work well with others	7